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JOHN BARTON PAYNE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 481

SURFACE WATER SUPPLY OF THE UNITED STATES
1918

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

NATHAN C. GROVER, Chief Hydraulic Engineer
H. D. McGLASHAN AND F. F. HENSHAW, District Engineers

Prepared in cooperation with
THE STATES OF CALIFORNIA AND OREGON

Fish & Game Commission
Library Copy
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Fish & Game Commission
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SAN FRANCISCO, CALIF.

SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN CALIFORNIA, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structrue, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1919.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgements for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknoweledged on page 13.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being

maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation;" an abbreviation for the term "relation of gage height to discharge."

"Control;" a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river falls when the discharge is reduced to zero.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1916, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceeding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day.

If such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 10, are based.

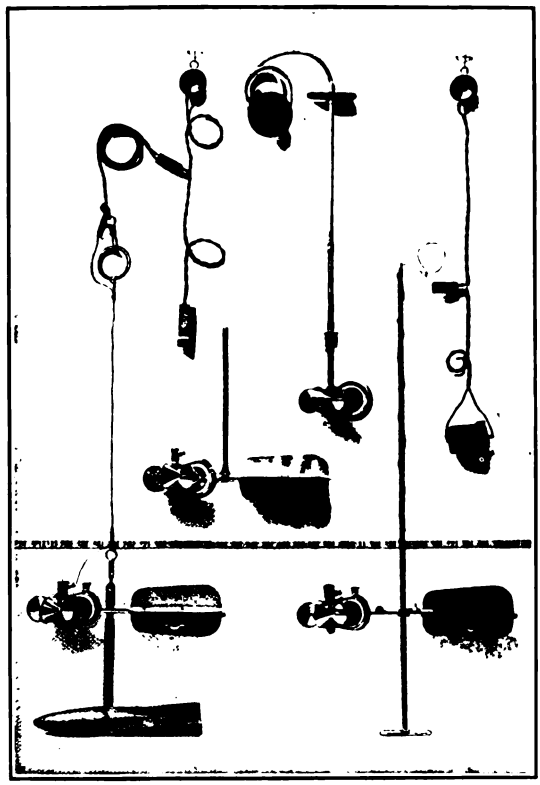
ACCURACY OF FIELD DATA AND COMPUTED RECORDS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the stage-discharge relation and (2) on the accuracy of observation of stage, measurement of flow, and interpretation of records.

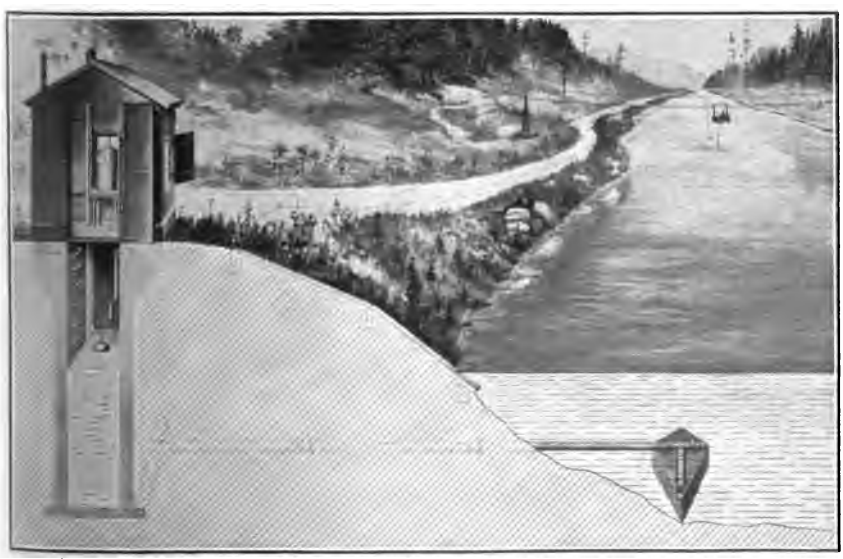
A paragraph in the discription of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

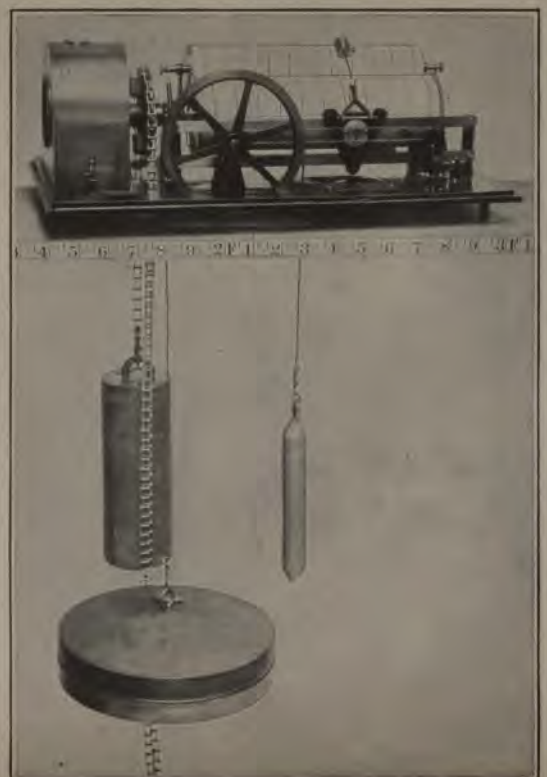
The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square



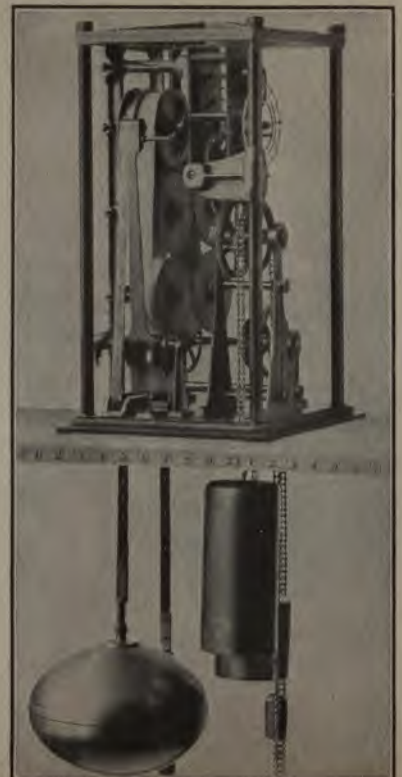
A. PRICE CURRENT METERS.



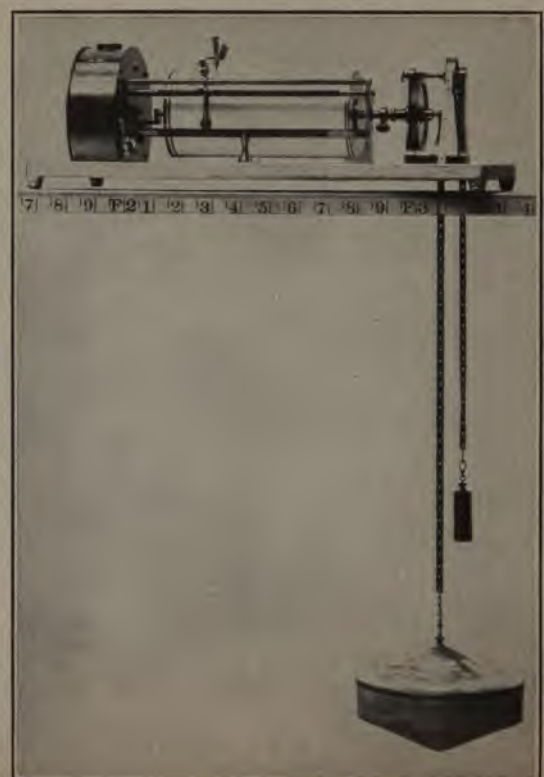
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

Investigation of the water resources of California is being carried on by the United States Geological Survey in cooperation with the State in accordance with acts of the State legislature approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909, empowering the State authorities to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps, gaging streams, and surveying reservoir sites and canal locations for the conservation and utilization of the flood and storm waters of the State. The work for the year 1917–18 was maintained in accordance with the contract approved by the State board of control and signed by W. F. McClure, State engineer.

Additional funds for the maintenance of river-measurement stations were furnished by the State Water Commission of California. The members of the commission are A. E. Chandler, president, W. A. Johnstone and Irving Martin, commissioners; W. D. Stephens, governor; and W. F. McClure, State engineer. Josephine A. Patten is secretary.

The entire expense of the stream-flow investigations in Tuolumne River drainage basin for the Hetch Hetchy project is paid by the city and county of San Francisco, through M. M. O'Shaughnessy, city engineer.

All stations in Los Angeles County, except that on San Gabriel River, are maintained in accordance with a contract between the county board of supervisors, the United States Department of Agriculture, represented by the Forest Service through F. H. Fowler, district engineer, and the United States Weather Bureau, through Ford A. Carpenter, meteorologist, and the United States Geological Survey. Los Angeles County pays all expenses of the field work except services furnished by the Forest Service, Weather Bureau, and Geological Survey. The Geological Survey supervises the work and compiles all field data for publication.

Assistance in the maintenance of river-measurement stations was furnished by the United States Forest Service, through F. H. Fowler, district engineer; United States Weather Bureau, through Ford

A. Carpenter, W. E. Bonnett and N. R. Taylor, meteorologists; United States Indian Service; United States Bureau of Fisheries; Yosemite National Park, through W. B. Lewis, superintendent; County of Los Angeles; Santa Barbara Water Commission; Volcan Land & Water Co. and Cuyamaca Water Co., through Ed. Fletcher, manager, and W. S. Post, consulting engineer; Southern California Edison Co., through H. W. Dennis, construction engineer; and Turlock, Modesto, Oakdale, and South San Joaquin irrigation districts.

Many complete records of run-off, gage-height records, and discharge measurements are furnished by Federal bureaus, private companies, and individuals who are interested in the water resources of California. This cooperation is acknowledged and explained in the descriptions that precede the records.

The work in Oregon was carried on under a cooperative agreement with the State through John H. Lewis, State engineer. Financial cooperation was also furnished by the United States Indian Office, Goose Lake Valley Irrigation Co., Talent Irrigation District, and Medford Irrigation District.

DIVISION OF WORK.

The data for stations in California were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, by William Kessler, F. C. Ebert, Charles Leidl, J. F. Kunesh, C. J. Emerson, C. W. Sopp, H. J. Tompkins, Ernest Tompkins, and A. M. Machin.

The field work in Oregon was carried on under the direction of F. F. Henshaw, district engineer, by R. C. Briggs, and by H. W. Humphrey, hydrographer of the United States Reclamation Service. The ratings, special estimates, and computations were made and data prepared for publication by F. F. Henshaw, district engineer, assisted by C. L. Batchelder, R. C. Briggs, and H. W. Humphrey.

GAGING-STATION RECORDS.

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CALIF.

LOCATION.—In SE. ¼ sec. 25, T. 15 S., R. 3 E., at Ellis ranch, 2 miles below mouth of Guatay Creek and 1½ miles below Descanso, San Diego County.

DRAINAGE AREA.—43.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 21, 1905, to September 30, 1918.

GAGE.—Staff in three sections on left bank a short distance below intake of Ellis ditch. Previous gages were at approximately the same location but at different datums. Read by C. H. Ellis.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Channel is cut in sand and fine gravel; bed shifting. Banks are generally high and not likely to be overflowed. A group of large boulders about 125 feet below gage acts as a partial control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet during morning of March 12 (discharge about 1,720 second-feet); minimum stage not known; record incomplete.

1905–1918: Maximum stage recorded, not known, occurred January 27, 1916 (discharge, 9,870 second-feet); stream dry during a portion of the years 1910, 1911, 1913, and 1916.

DIVERSIONS.—About 0.3 second-foot is diverted above gage for irrigation on Ellis ranch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Several fairly well defined rating curves were used for short periods. Gage read to hundredths twice a day except October 28 to November 3, January 2–5, June 10–15, and July 28 to September 30, when no observations were made. Daily discharge read from rating curves covering short periods or interpolated between discharge measurements. For periods not covered by gage heights discharge was interpolated or estimated from records on other streams. Records for first half of year, fair; remainder poor.

Discharge measurements of Sweetwater River near Descanso, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	F. C. Ebert	0.00	0.8	Mar. 7	H. D. Ellis	0.27	6.2
Jan. 1	Ebert and Ellis	−0.20	.4	8	do	.56	31
9	H. D. Ellis	.00	.8	9	F. C. Ebert	.25	8.6
13	do	.46	13	13	H. D. Ellis	1.52	141
27	do	.17	3.7	19	do	1.41	25
Feb. 11	do	.12	1.4	19	do	1.65	138
20	do	.17	4.6	May 7	F. C. Ebert	.67	2.7
22	do	.54	23	29	H. D. Ellis	.46	4.4
				Aug. 22	F. C. Ebert	−0.16	.3

Daily discharge, in second-feet, of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	0.9	0.8	0.9	0.4	3.2	4.8	31	5.5	3.5	4.0
2	.9	.8	.9	.5	3.4	5	31	4.0	3.7	4.4
3	.8	.8	.9	.6	3.8	5	30	3.0	3.5	4.4
4	.8	.8	.9	.7	3 6	5	30	2.5	3.5	4.0
5	.9	.8	.9	.8	3.0	4.8	29	2.5	3.5	3.5
6	.9	.9	.9	.8	1.4	5	28	2.5	3.5	3.0
7	.9	.8	.8	.8	1.0	7	28	2.5	3.5	3.0
8	.9	.9	.8	.8	1.0	22	27	2.5	3.5	3.2
9	.9	.9	.9	.9	1.0	12	26	2.5	4.0	2.4
10	.9	.9	.9	.9	1.0	10	26	2.6	4.0	2.2
11	.8	.9	.9	.9	1.0	630	24	2.7	4.0	1.6
12	.8	.9	.9	.9	1.0	910	20	2.8	4.0	1.0
13	.8	.9	.8	8	1.0	130	17	2.8	4.0	.8
14	.9	.9	.8	3.6	1.0	100	15	3.0	4.0	.5
15	.9	.9	.8	3.2	1.0	80	14	3.1	4.0	.4
16	.9	.9	.9	3.2	1.0	60	15	3.2	35	.4
17	.9	.9	.8	2.8	1.0	40	14	3.3	2.0	.4
18	.8	.9	.8	2.5	6.5	24	14	3.4	1.8	.4
19	.8	.9	.8	2.2	6.5	82	14	3.5	3.0	.4
20	.8	.9	.8	2.2	6	40	14	3.6	.7	.4
21	.9	.9	.8	2.2	7	28	13	3.7	.5	.4
22	.	.9	.8	2.1	19	36	13	3.8	.8	.4
23	.8	.9	.9	2.2	8.5	40	13	3.9	1.2	.3
24	8	.9	.9	2.4	7	40	13	4.0	1.8	.3
25	8	.9	.9	2.2	7	40	13	4.1	2.4	.3
26	.8	.9	.9	2.7	6	36	13	4.2	2.9	.3
27	.8	.9	.9	3.6	5	35	11	4.3	3.2	.3
28	.8	.9	.8	3.8	4.7	35	10	4.4	3.2	.3
29	.8	.9	.8	3.2	.....	34	9.5	4.4	3.7	.3
30	.8	.9	.8	3.2	.....	34	7	4.0	4.0	.3
31	.8	.....	.9	3.0	.....	33	.....	3.7	.....	.3

NOTE.—No gage-height record Oct. 28 to Nov. 3; Jan. 2–5, discharge interpolated; June 10–15 and July 28–31, discharge estimated; Aug. 1 to Sept. 30, estimated as 1 second-foot.

Monthly discharge of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.9	0.8	0.84	51.6
November	.9	.8	.88	52.4
December	.9	.8	.85	52.3
January	8.0	.4	2.17	133.
February	19	1.0	4.02	223
March	910	4.8	82.8	5,090
April	31	7	18.8	1,120
May	5.5	2.5	3.42	210
June	35	.5	4.08	243
July	4.4	.3	1.42	87.
August	.....	.....	[a] 1.0	61.
September	.....	.....	[a] 1.0	59.
The year	910	.....	10.2	7,380

[a] Estimated.

SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER NEAR SANTEE, CALIF.

LOCATION.—In El Cajon grant, at old Mission dam, below Spring Canyon and just above Oak Canyon, 4½ miles west of Santee, San Diego County.

DRAINAGE AREA.—375 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 25, 1912, to September 30, 1918 (record not complete).

GAGE.—Staff in two sections installed December 12, 1916. Lower section is bolted to upstream face of old dam near left end. Upper section fastened to large sycamore tree on left bank just above dam. Original location and datum have been maintained. Zero of gage is 266.42 feet above sea level, U. S. Geological Survey datum. Gage read by Thomas Netting.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. The old Mission dam serves as part control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.5 feet at noon March 12 (discharge, 12,000 second-feet); stream dry during October and November and June to September, except for a small quantity of ground water rising to the surface at the dam.

1912–1918: Maximum stage recorded, 25.1 feet January 27, 1916 (discharge, 70,200 second-feet); stream practically dry for several months each year.

DIVERSIONS.—See Cuyamaca Water Co.'s flume near Lakeside. Water for irrigation is pumped from wells along the river above and below Lakeside.

REGULATION.—Water is stored at Cuyamaca reservoir on Boulder Creek.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve is fairly well defined throughout. Gage read usually to half-tenths once a day; frequent observations were made during the flood March 11–13. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record obtained in cooperation with Cuyamaca Water Co., Ed Fletcher, manager.

Discharge measurements of San Diego River near Santee, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	F. C. Ebert	3.82	0.1	11	F. C. Ebert	11.10	1,810
Jan. 4	do	3.84	.2	12	do	12.85	7,810
Feb. 7	D. A. McClung	3.84	.09	12	do	12.20	4,950
Mar. 6	F. C. Ebert	3.88	.26	13	do	10.95	1,750
9	do	3.85	.2	14	do	8.40	500
11	do	5.35	38	16	do	7.10	191
11	do	10.11	1,070	May 8	do	4.00	1.1

Daily discharge, in second-feet, of San Diego River near Santee, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1				0.2	38	2	16				201	5	
2				.2	35	2	17				138	5	
3				.2	32	2	18				117	5	
4		0.2		.2	30	2	19				376	5	
5				.2	30	1	20				475	4	
6				.3	28	1	21				288	4	
7			0.2	.3	21	1	22				161	4	
8				.5	18	1.1	23	0.1			117	4	
9				.2	16		24				108	4	
10				.2	14		25				99	3	
11				127	12		26				82	3	
12				5,350	8		27				74	3	
13				1,220	8		28				67	3	
14				462	8		29				53	3	
15				308	7		30				47	2	
							31				41		

NOTE.—No flow Oct. 1 to Nov. 30 and June 1 to Sept. 30. No gage-height record until Mar. 5 and after Apr. 16. Discharge estimated Mar. 1–5, 7, 8, and 10; interpolated Apr. 17 to May 8. December estimated as 0.1 second-foot, January and February as 0.2 second-foot, and May as 0.7 second-foot.

BOULDER CREEK NEAR JULIAN, CALIF.

LOCATION.—In Cuyamaca grant, at outlet of Cuyamaca reservoir, 7 miles south of Julian, San Diego County, and 12 miles above mouth of Boulder Creek.

DRAINAGE AREA.—12.0 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 19, 1912, to September 30, 1918.

GAGE.—Vertical staff fastened on right side of weir box, 3½ feet above weir. Zero at elevation of crest of the 6-foot Cippoletti weir which is 100 feet below outlet gates of reservoir. Gage read by watchman at dam.

DISCHARGE MEASUREMENTS.—Made by wading near weir. On account of velocity of approach, it has been necessary to rate weir.

CONTROL.—Cippoletti weir acts as permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge reported during year 24 second-feet February 5.

1912–1918: Maximum mean daily discharge recorded occurred January 28, 1916 (discharge, 1,877 second-feet). No water is released from reservoir except when needed for Cuyamaca Water Co.'s flume.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by operation of outlet gate of reservoir. Cuyamaca dam, completed in 1886, was one of the first earth dams built in California to store water for irrigation. The dam was originally 35 feet high but in 1894 was enlarged, increasing the capacity of the reservoir to 11,400 acre-feet. The present dam is 635 feet long and 41½ feet high, with an inner slope of 2:1 and an outer slope of 1½:1. From the reservoir the water flows 12½ miles down the natural channel of Boulder Creek and San Diego River to the intake of Cuyamaca Water Co.'s flume.

ACCURACY.—Stage-discharge relation permanent except when changes are made in weir. Gage read daily to hundredths; additional observations are made when reservoir gates are changed. Records excellent when discharge does not exceed capacity of weir.

COOPERATION.—Record of daily discharge furnished by Cuyamaca Water Co., Ed. Fletcher, manager.

Daily discharge, in second-feet, of Boulder Creek near Julian, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.9	9.4	.....	2.7	.....	.....	.....	.....	.....	7.2	11.6	11.6
2	8.9	4.3	.....	2.7	7.7	.....	.....	.....	.....	7.2	11.6	7.5
3	8.9	4.3	.....	2.7	11.1	.....	.....	.....	.....	11.4	11.6	7.5
4	8.9	4.3	.....	2.7	12.6	.....	.....	.....	.....	11.4	11.6	7.5
5	8.9	4.3	.....	2.7	24	.....	.....	.....	.....	11.4	11.6	7.5
6	8.9	4.3	.....	2.5	22	.....	.....	.....	.....	11.4	11.6	7.5
7	8.9	.....	.....	1.8	19.2	.....	.....	.....	.....	11.4	11.6	7.5
8	8.9	.....	.....	1.8	21	.....	.....	.....	4.4	11.4	11.6	7.5
9	8.9	.....	.....	1.8	23	.....	.....	.....	7.2	11.4	11.6	7.5
10	8.9	2.2	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	7.5
11	8.9	3.6	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	9.2
12	8.9	3.6	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	11.6
13	4.4	3.6	.....	1.0	22	.....	.....	.....	7.2	8.9	11.6	11.6
14	6.9	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	10.1
15	3.0	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	10.1
16	5.3	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	8.0
17	2.6	3.6	.....	.....	22	.....	.....	4.7	7.2	8.9	11.6	8.0
18	4.3	3.6	1.6	.....	14.1	.....	.....	4.7	7.2	8.9	11.6	8.0
19	4.3	3.6	1.6	.....	.....	.....	.....	4.7	7.2	8.9	11.6	8.0
20	4.3	3.6	1.6	.....	.....	.....	.....	3.9	7.2	8.9	11.6	8.0
21	4.3	3.6	1.6	.....	2.0	.....	.....	2.7	7.2	11.6	11.6	8.0
22	4.3	3.6	1.6	.....	.6	.....	.....	2.0	7.2	11.6	11.6	8.0
23	4.3	3.6	2.3	.....	.....	.....	.....	.8	7.2	11.6	11.6	8.0
24	4.3	3.6	2.3	.....	.....	.....	.....	.8	7.2	11.6	11.6	8.0
25	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
26	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
27	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
28	4.3	.....	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
29	4.3	.....	.9	.....	.....	.....	.....	.4	7.2	11.6	11.6	10.7
30	4.3	.....	.9	.....	.....	.....	.....	.....	7.2	11.6	11.6	10.7
31	4.3	.....	.9	.....	.....	.....	.....	.....	.....	11.6	11.6	.....

NOTE.—Creek dry on days for which discharge is not given.

Monthly discharge of Boulder Creek near Julian, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.9	2.6	6.10	375
November	9.4	.0	3.14	187
December	2.3	.0	.61	37.5
January	2.7	.0	.90	55.3
February	24	.0	11.9	661
March	.0	.0	.00	.0
April	.0	.0	.00	.0
May	4.7	.0	.90	55.3
June	7.2	.0	5.43	323
July	11.6	7.2	10.6	652
August	11.6	11.6	11.6	713
September	11.6	7.5	8.93	531
The year	24	.0	4.96	3,590

CUYAMACA WATER CO.'S FLUME AT DIVERTING DAM, NEAR LAKESIDE, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 14 S., R. 2 E., just below intake, at diverting dam, 13 miles northeast of Lakeside, San Diego County.

RECORDS AVAILABLE.—June 1, 1912, to September 30, 1918.

GAGE.—Vertical staff in a stilling box on outside of flume, about 1,000 feet below intake, installed April 8, 1916. Previous gage was similar but was 500 feet below intake and just above sand box. Datum has always been elevation of floor of flume. Gage read by employees of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—The flume is lined with tar paper to reduce leakage.

EXTREMES OF DISCHARGE.—1912–1918: Maximum daily discharge 51 second-feet, March 24, 1913. No flow for certain periods nearly every year.

ACCURACY.—Stage-discharge relation permanent for years 1916–1918. Rating curve used for entire year is well defined. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Cuyamaca Water Co.'s flume, which diverts water from San Diego River and receives water from the South Fork of San Diego River, is more than 30 miles long, 6 feet wide, and 24 inches deep. It discharges into La Mesa reservoir, about 8 miles northeast of San Diego. This system supplied the city of San Diego with water until 1906, when the Southern California Mountain Water Co. extended its system to the city. The flume was again used to supply the city of San Diego after the floods of 1916, and it now supplies water for irrigation and domestic service. The Capitan Grande Indian Reservation has a water right of 0.8 second-foot from this flume.

Discharge measurements of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	D. A. McClung	0.52	4.3	Nov. 9	D. A. McClung	0.40	2.6
7	do	.89	10.5	10	do	.82	9.3
7	do	.71	7.0	Feb. 8	do	1.33	22
7	do	1.02	13.4	Mar. 7	F. C. Ebert	.92	12.2

Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	3.7	.....	3.0	3.7	9.6	26	8.3	7.4	6.1	9.8	10.5
2	6.5	7.8	.....	3.3	4.0	7.8	26	7.6	6.8	5.6	10	9.6
3	6.6	4.6	.....	3.3	9.8	6.8	26	6.3	4.4	7.0	10	7.4
4	6.1	3.7	.....	3.4	11	6.3	26	5.7	4.0	8.7	9.3	6.5
5	6.1	3.8	.....	6.1	21	6.1	24	5.7	4.9	9.1	9.1	5.7
6	6.1	5.2	.....	3.3	23	6.1	19.5	6.3	4.3	9.3	9.8	6.3
7	6.1	7.6	.....	3.1	22	10.5	20	6.5	2.7	9.6	10.5	6.6
8	6.3	4.9	.....	3.3	23	22	18	7.2	2.4	9.6	10	6.5
9	6.3	1.5	.....	3.4	25	29	18.5	10.5	4.4	9.8	10.5	6.3
10	6.5	4.0	.....	3.6	25	29	18.5	10.5	6.5	9.6	10.5	6.3
11	6.8	3.0	.....	3.3	25	20	17.5	8.7	5.6	9.6	10	7.4
12	8.0	3.0	.....	2.9	25	13.5	18	8.0	6.6	9.6	10	8.7
13	7.6	4.3	.....	10	26	18	18.5	6.3	6.5	9.1	10	10.5
14	7.6	5.2	.....	9.3	26	14.5	19.5	6.3	5.9	8.0	10	10
15	7.8	5.0	.....	4.6	26	28	17.5	5.7	6.8	7.2	10.5	9.3
16	7.8	5.0	.....	3.1	20	28	16	6.3	7.4	7.2	12	9.6
17	7.2	5.0	.....	2.7	24	28	14	5.9	8.5	6.5	11.5	8.0
18	5.9	5.0	.....	2.6	27	28	12.5	7.2	7.4	6.5	10	6.1
19	4.4	4.4	3.0	1.8	22	26	9.1	8.3	7.6	7.4	9.8	5.6
20	3.7	3.8	6.3	1.8	12.5	15	9.6	7.8	8.3	6.5	9.8	6.1
21	3.7	3.8	5.2	2.0	10.5	25	10.5	8.0	6.8	7.6	9.8	6.3
22	3.7	4.0	4.8	2.0	23	27	12.5	8.3	7.8	8.7	9.8	7.2
23	3.7	4.9	4.6	2.0	23	28	11	9.1	7.0	9.3	9.8	8.0
24	3.7	5.2	3.6	2.0	23	25	12	7.0	7.8	9.6	9.8	9.3
25	3.7	5.4	4.0	2.0	18.5	25	11.5	6.6	7.4	9.8	9.8	9.6
26	3.7	5.6	4.3	16	20	27	10	6.6	6.8	9.8	9.8	9.8
27	3.7	5.7	3.8	17	16.5	26	9.6	6.6	6.3	9.8	9.8	9.8
28	3.7	5.6	3.1	7.0	13.5	26	8.3	7.2	6.3	9.8	10	9.8
29	3.7	6.5	3.3	5.2	.....	26	8.5	14	6.1	9.8	10.5	9.6
20	3.7	6.6	3.3	3.7	.....	26	8.7	13.5	6.5	9.6	10.5	10
31	3.7	.....	3.3	3.7	.....	26	.....	7.8	.....	9.6	10.5	.....

NOTE.—No flow Dec. 1–18. Discharge July 24 interpolated.

Monthly discharge of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.0	3.7	5.50	338
November	7.8	1.5	4.79	285
December	6.3	.0	1.70	105
January	17	1.8	4.53	279
February	27	3.7	19.6	1,090
March	29	6.1	20.6	1,270
April	26	8.3	15.9	946
May	14	5.7	7.74	476
June	8.5	2.4	6.24	371
July	9.8	5.6	8.56	526
August	12	9.1	10.1	621
September	10.5	5.6	8.08	481
The year	29	.0	9.37	6,790

CUYAMACA WATER CO.'S FLUME NEAR LAKESIDE, CALIF.

LOCATION.—At patrolman's cabin half a mile above trestle crossing at Los Coches Creek, 3 miles southeast of Lakeside, San Diego County, and 20 miles below intake on San Diego River.

RECORDS AVAILABLE.—January 1, 1907, to September 30, 1918.

GAGE.—Vertical staff in a stilling box fastened to outside of flume just below patrolman's cabin at same site as water-stage recorder used in previous years. Position of gage has been changed slightly several times since station was first established, but datum has always been same as elevation of floor of flume. Gage read by an employee of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume near gage.

CHANNEL AND CONTROL.—In the fall of 1914 the flume was deepened 8 inches and more tar-paper lining was put in. Capacity of flume slightly increased as a result of repairs made December 1–19, 1917.

EXTREMES OF DISCHARGE.—1907–1918: Maximum mean daily discharge, 25 second-feet, February 16, 1918. No flow certain periods every year.

ACCURACY.—Stage-discharge relation not permanent throughout the year. Flume repaired December 1–19, 1917, and resulted in a change in rating. Two fairly well defined rating curves were used during the year. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

There is a small diversion from this flume at Capitan Grande Indian Reservation above the station. Water is also diverted into the flume from South Fork of San Diego River. For location of intake, description of flume, and explanation of the use of the water, see description of Cuyamaca Water Co.'s flume at diverting dam near Lakeside (p. 20).

Discharge measurements of Cuyamaca Water Co.'s flume near Lakeside, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	D. A. McClung	0.80	7.6	Feb. 7	D. A. McClung	1.33	22
8	do	1.01	11.9	Mar. 9	F. C. Ebert		23
9	do	.54	3.4	May 7	do	.82	9.1
10	do	.52	2.8	Aug. 22	do	.80	9.0
11	do	.59	3.7	Sept. 7	D. A. McClung	.61	4.8
Dec. 22	F. C. Ebert		6.4				

Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.9	3.7	.....	3.9	5.9	12.5	22	12	7.6	5.5	7.2	8.6
2	5.9	6.6	.....	3.4	5.0	10	22	11.5	7.4	5.5	7.8	8.4
3	5.9	6.6	.....	3.9	10	9.3	22	11	5.3	7.2	8.0	6.4
4	5.7	5.9	.....	3.8	11.5	8.8	22	9.5	4.4	6.8	8.0	5.2
5	5.7	3.9	.....	3.9	19	8.2	22	9.5	4.6	8.0	7.6	4.6
6	5.7	5.7	.....	4.4	23	8.2	19	9.7	5.3	8.4	7.0	4.6
7	5.7	5.7	.....	3.9	22	10.5	20	8.8	4.0	7.6	7.6	4.6
8	5.4	12	.....	4.0	22	22	20	8.8	3.4	8.0	7.6	4.8
9	5.7	3.9	.....	3.9	23	22	17.5	13.5	3.6	8.0	7.9	4.6
10	5.5	3.9	.....	4.0	24	23	19	15	6.2	8.0	8.2	4.0
11	5.7	4.8	.....	4.0	24	19	19	13	4.6	8.0	7.8	4.8
12	6.1	4.6	.....	2.6	24	12	19.5	12	5.0	8.6	7.6	6.1
13	6.4	4.8	.....	5.2	24	12	20	9.3	5.3	8.2	8.2	7.0
14	6.1	5.4	.....	11	24	22	21	8.4	5.0	7.8	8.4	8.0
15	6.3	3.2	.....	5.5	24	18	19	7.8	6.1	6.4	9.0	6.8
16	7.8	5.2	.....	2.4	25	6.1	17.5	8.2	6.4	6.4	9.7	6.8
17	7.6	4.4	.....	2.4	24	20	15.5	8.0	7.6	6.1	9.3	6.1
18	3.6	5.2	.....	3.0	25	20	13	8.8	6.2	5.5	8.2	5.3
19	3.6	5.2	.....	2.8	23	22	11	9.7	7.0	5.5	8.2	5.0
20	3.0	4.8	6.8	2.2	16	2.9	9.3	9.9	7.6	5.3	8.4	5.2
21	3.5	5.0	6.6	3.6	12.5	20	8.6	8.6	6.8	5.3	8.6	5.0
22	3.5	5.0	6.4	3.3	20	22	6.6	8.4	5.9	6.1	8.2	5.3
23	3.5	5.2	4.2	4.0	24	23	11.5	7.0	5.7	7.4	8.2	6.1
24	3.6	5.7	4.5	3.2	23	21	13	6.6	5.9	7.4	8.2	6.1
25	3.2	5.7	4.4	4.0	19.5	21	13	6.8	6.4	7.0	7.4	6.4
26	3.6	6.1	4.2	14	22	22	12	6.8	6.6	7.8	8.8	6.8
27	3.6	5.9	4.0	16.5	19.5	22	12.5	6.4	6.8	8.0	8.2	7.0
28	3.6	5.7	4.2	10.5	16.5	22	12.5	6.4	5.7	8.0	8.8	6.8
29	3.7	5.4	4.2	7.2	.....	22	15.5	9.9	5.7	7.0	8.2	6.2
30	3.9	5.4	4.2	5.9	.....	22	11.5	14	5.5	7.2	8.8	6.2
31	3.6	.....	4.2	5.9	.....	22	.....	8.8	.....	7.4	8.6	.....

NOTE.—Flume being repaired, no flow Dec. 1–19.

Monthly discharge of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7.8	3.0	4.92	303
November	12	3.2	5.35	318
December	6.8	.0	1.87	115
January	16.5	2.2	5.11	314
February	25	5.0	19.8	1,100
March	23	2.9	17.0	1,050
April	22	6.6	16.2	964
May	15	6.4	9.49	584
June	7.6	3.4	5.79	345
July	8.6	5.3	7.08	435
August	9.7	7.0	8.18	503
September	8.6	4.0	5.96	355
The year	25	.0	8.82	6,390

SAN DIEGUITO RIVER BASIN.

SANTA YSABEL CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ sec. 21, T. 12 S., R. 2 E., at Sutherland dam site, 1 mile below Sutherland, 1½ miles above mouth of Black Canyon Creek, and 4½ miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—53.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 29, 1912, to September 30, 1918.

GAGE.—Fries water-stage recorder on right bank just above Sutherland dam site. Gage datum was lowered 0.21 foot on October 12, 1916, on account of change in control. Previous gages have been at same location but original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. A concrete control constructed at an outcropping of bedrock 20 feet below gage was repaired November 6–9, 1916. Banks are high, covered with brush, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.75 feet at 8 a. m. March 12 (discharge, 1,390 second-feet); minimum stage from water-stage recorder, 0.87 foot at 7 p. m. July 30 (discharge, 0.1 second-foot).

1912–1918: Maximum stage recorded, 11.0 feet January 27, 1916 (discharge, 21,100 second-feet); stream dry October 1–2, 1913; August 12–29; and September 6–13, 1914.

DIVERSIONS.—No large diversions above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly by the high water on March 12. Rating curves are fairly well defined below 600 second-feet. The operation of the water-stage recorder was satisfactory except October 7–12 and June 8–14, when staff gage readings were used. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting gage-height graph, except on March 7, 10–13, and 19, when hourly discharges were averaged. Records fair.

Discharge measurements of Santa Ysabel Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	D. A. McClung	1.10	0.6	Mar. 14	F. C. Ebert	1.87	79
Nov. 19	do	1.20	1.4	31	D. A. McClung	1.42	19
Dec. 9	do	1.22	1.9	May 6	F. C. Ebert	1.34	12
24	do	1.23	2.8	Aug. 13	D. A. McClung	1.15	1.6
31	F. C. Ebert	1.22	2.8	30	do	1.12	.4
Mar. 8	do	1.68	35				

Daily discharge, in second-feet, of Santa Ysabel Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	0.9	2.9	2.2	3.2	5	21	12	10	5.5	0.5	1 5
2	1.0	.9	2.9	2.2	3.2	4.6	22	12	9.5	4.1	.5	.7
3	.6	.7	2.9	1.5	3.2	4.6	22	12	9.5	3.5	.3	.2
4	.5	1.1	2.2	1.5	3.2	4.3	21	12	9.5	3.5	.5	.2
5	.5	1.8	2.2	1.5	3.2	4.3	21	12	9	3.5	.7	.2
6	.9	4.6	2.6	1.8	2.9	7	20	12	8.5	3.0	1.0	.2
7	.7	5	2.6	1.8	3.6	36	19	12	9	3.5	3.5	.1
8	.7	4.0	1.5	2.2	2.9	52	17	12	8.5	3.5	4.1	.2
9	.7	3.2	1.4	2.9	2.6	14	18	14	9	4.1	2.0	.2
10	.9	2.9	1.4	2.9	2.9	19	17	13	8.5	.3	2.5	.2
11	1.2	2.6	1.8	2.9	2.9	204	17	12	6.5	.3	1.0	.5
12	1.2	2.2	1.8	2.9	3.2	671	18	12	3.5	.3	1.5	3.0
13	1.3	2.2	2.6	9	3.2	208	20	12	4.7	.3	2.0	5.5
14	1.8	2.6	1.8	4.0	3.6	78	19	12	3.5	.3	3.0	6
15	1.5	2.9	1.5	3.6	3.6	56	17	12	6.5	.3	4.1	3.5
16	2.2	2.9	1.5	2.9	3.6	38	16	12	7.5	.2	4.1	3.0
17	2.9	2.2	1.5	2.9	4.6	34	15	12	6	2.0	3.5	2.5
18	2.2	1.4	1.8	2.2	18	30	14	12	6	3.0	2.5	2.0
19	1.2	1.4	1.8	3.2	11	68	13	12	7.5	2.0	1.5	2.5
20	1.2	2.2	1.8	2.9	7.5	93	12	12	7	1.5	.3	1.0
21	1.0	1.8	2.2	2.9	5.5	59	11	11	6.5	1.0	.3	1.0
22	1.1	2.6	2.9	2.6	27	51	12	10	7	1.0	.2	2.5
23	1.1	3.2	2.2	2.2	13	45	13	10	7	.2	.2	3.0
24	1.0	4.0	2.6	2.2	8.5	43	14	9.5	7.5	.2	.2	1.5
25	1.1	4.0	2.2	6	9.5	34	14	9.5	7	.2	.2	.7
26	1.1	3.2	2.2	13	8	32	15	10	6	.2	.2	.5
27	1.3	3.2	1.8	7	7	29	16	10	5.5	.2	3.5	.5
28	1.8	2.9	2.2	5.5	5.5	24	16	14	6.5	.2	1.0	.3
29	1.4	2.9	1.8	5	.....	22	15	22	6	.3	.5	.3
30	1.2	2.9	2.2	4.3	.....	21	14	13	5.5	.2	1.5	.4
31	1.0	.....	1.8	4.0	.....	20	.....	12	.....	.2	2.5	.....

Monthly discharge of Santa Ysabel Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off, in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.9	0.5	1.20	73.8
November	5	.7	2.61	155
December	2.9	1.4	2.08	128
January	13	1.5	3.60	221
February	27	2.6	6.29	349
March	671	4.3	64.9	3,990
April	22	11	16.6	988
May	22	9.5	12.1	744
June	10	3.5	7.14	425
July	5.5	.2	1.57	96.5
August	4.1	.2	1.59	97.8
September	6	.1	1.46	86.9
The year	671	.1	10.2	7,360

SANTA YSABEL CREEK NEAR RAMONA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 27, T. 12 S., R. 1 E., at Pamo dam site, at lower end of Pamo Valley, 1½ miles below mouth of Temescal Creek and 4½ miles north of Ramona, San Diego County.

DRAINAGE AREA.—110 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1912, to September 30, 1918.

GAGE.—Leitz water-stage recorder, on left bank at dam site was in operation from November 3 to December 1, 1917; vertical staff fastened to outside of gage well, known as gage "C" was used during remainder of year. Gage read by C. M. DeVenelle. Original gage was a staff in four sections on left bank, one-half mile upstream, with a short vertical section at concrete control.

DISCHARGE MEASUREMENTS.—Made from cable about 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Shifting sand banks are high and clean; channel straight for 200 feet above and 600 feet below gage. Concrete control built across channel just below gage, was completed December 8, 1916, and was destroyed by the high water on March 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage during year, 9.1 feet at 9.30 a. m. March 12 (approximate discharge estimated from Mesa Grande record, 2,500 second-feet); minimum stage August 25–26 (discharge, 0.2 second-foot).

1912–1918: Maximum stage recorded, 14.0 feet January 27, 1916 (discharge, 28,400 second-feet); minimum stage, 0.74 foot October 1–6, 1915 (discharge, 0.1 second-foot).

DIVERSIONS.—No large diversions above the station. Water is diverted from Santa Ysabel Creek near the mouth of the canyon, 5 miles below the station, by East San Pasqual ditch, which takes out on the left bank, and West San Pasqual ditch, which takes out on the right bank and below the intake of the East San Pasqual.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout the year. Staff gage read to hundredths twice daily. Fairly well-defined rating curves used October 1 to December 24; December 25 to March 10; March 26 to August 17; August 18–31; and September 1–30. Daily discharge for these periods ascertained by applying mean daily gage height to rating table. Mean daily gage height from water-stage recorder sheets determined by inspecting recorder graph. Discharge March 12–13 and 15–25 estimated from Mesa Grande record. Records fair for periods covered by rating curves; those for other periods roughly approximate.

Discharge measurements of Santa Ysabel Creek near Ramona, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	T. P. Ellis	1.25	1.3	Mar. 14	F. C. Ebert	2.38	131
Nov. 19	McClung and DeVenelle	1.34	2.5	Apr. 1	D. A. McClung	2.65	32
Dec. 23	D. A. McClung	1.47	4.5	May 5	F. C. Ebert	2.41	15
31	F. C. Ebert	1.48	6.4	Aug. 12	D. A. McClung	2.08	1.2
Mar. 8	.....do	2.16	104	29	.....do	2.10	.5

Daily discharge, in second-feet, of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	2.2	4.7	6	12	14	31	12	3.6	1.8	0.9	1.8
2	1.4	2.2	4.4	6	11	13	32	12	3.3	1.5	1.0	1.5
3	1.4	2.0	4.7	6	10	11	32	12	3.3	1.8	1.0	1.1
4	1.4	2.3	4.2	6	9.5	9.5	30	12	2.7	2.1	1.1	1.0
5	1.4	2.4	4.2	6.5	9.5	9	28	12	2.4	1.8	1.3	.9
6	1.4	5.5	4.4	6	8.5	13	27	12	2.1	2.1	1.5	.8
7	1.4	19	5.0	6	9.5	128	27	12	2.1	2.1	2.4	1.0
8	1.6	13	4.4	6	9.5	121	25	12	1.8	1.8	3.6	1.1
9	1.4	8	4.0	6	9	22	22	16	1.5	1.5	1.3	1.1
10	2.0	5.5	4.7	6.5	7.5	14	23	14	1.3	1.5	1.1	1.1
11	1.8	5.5	4.7	6.5	7	580	23	13	1.1	1.1	1.3	.9
12	2.9	5.5	5.0	6.5	7.5	1,300	23	12	1.0	1.0	1.1	.8
13	3.0	5.5	5.0	54	8	420	25	12	1.1	1.0	1.3	.8
14	3.7	5.5	5.5	17	8.5	131	23	12	1.8	1.1	1.1	.8
15	5.0	5.5	5.5	10	8.5	90	21	10	2.7	1.1	1.5	1.3
16	5.5	5.5	5.0	10	9	60	20	9	2.4	1.0	1.8	1.8
17	4.7	5.0	5.0	9	9.5	55	18	7.5	2.1	1.1	2.7	1.8
18	4.0	4.0	5.0	8.5	50	50	16	6.5	1.8	1.3	1.8	2.1
19	2.3	2.6	5.0	7.5	29	140	13	6	2.1	1.5	2.2	1.3
20	2.2	2.3	5.5	7	22	185	13	6	2.4	1.8	1.5	1.1
21	2.2	2.6	5.0	7.5	17	90	20	5.5	2.4	1.5	.9	.8
22	2.2	2.9	4.7	7	60	75	18	4.6	2.4	1.8	.4	.7
23	2.3	4.4	4.7	6	31	70	18	5	2.4	1.5	.4	.5
24	2.4	5.0	4.7	7	20	65	15	4.6	2.7	1.5	.4	.9
25	2.6	5.0	5.5	15	22	50	15	4 6	3.0	1.5	.2	1.1
26	2.8	5.0	6.0	48	20	42	14	5	3.3	1.3	.2	1.1
27	2.6	5.0	6.0	31	17	41	15	4.6	3.6	1.1	1.2	1.1
28	2.4	5.0	6.0	18	15	43	13	6.5	3.0	1.1	.5	1.1
29	2.6	5.0	6.0	12	.....	42	14	33	2.4	1 1	.4	1.0
30	2.6	5.0	6.0	12	.....	34	12	12	1.8	.9	.7	1.0
31	2.2	.....	6.5	12	.....	32	.....	4.2	.....	.8	1.8	.....

Monthly discharge of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.5	1.4	2.48	152
November	19	2.0	5.13	305
December	6.5	4.0	5.06	311
January	54	6	12.0	738
February	50	7	16.3	905
March	1,300	9	127	7,810
April	32	12	20.9	1,240
May	33	4.2	9.99	614
June	3.6	1.0	2.32	138
July	2.1	.8	1.42	87.3
August	3.6	.2	1.25	76.9
September	2.1	.5	1.11	66.0
The year	1,300	.2	17.2	12,400

SAN DIEGUITO RIVER NEAR BERNARDO, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 18, T. 13 S., R. 2 W., at Carroll dam site, 5½ miles below Bernardo Bridge, about 10½ miles above mouth of river, and 4 miles southwest of Bernardo, San Diego County.

DRAINAGE AREA.—299 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 17, 1916, to September 30, 1918.

GAGE.—Vertical staff in four sections on right bank at dam site. Zero of gage 214 feet above sea level. Gage read by F. E. Green.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading near gage.

CHANNEL AND CONTROL.—Shifting sand; bedrock outcrops about 400 feet below gage; fairly permanent except during low stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge 4,000 second-feet March 11; stream dry during the periods October 1 to November 8 and June 10 to September 30.

1916–1918: Maximum stage recorded, 21.2 feet 1 to 3 p. m. January 27, 1916 (discharge, 72,100 second-feet); no flow July 30 to September 30, 1916, June 30 to November 8, 1917, and June 10 to September 30, 1918.

DIVERSIONS.—East and west San Pasqual ditches divert water for irrigation from the Santa Ysabel at the upper end of San Pasqual Valley (see Santa Ysabel Creek near Ramona). Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent except for short periods during year. Construction of Lake Hodges dam interfered with maintenance of station and several rating curves were used. Gage read to hundredths twice daily, more frequently during high water. Daily discharge ascertained by applying gage height to rating table.

COOPERATION.—Daily discharge record furnished for publication by San Dieguito Mutual Water Co., through Ed Fletcher, president.

Discharge measurements of San Dieguito River near Bernardo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	F. E. Green		0.0	Mar. 9	F. E. Green	1.31	72
17	D. A. McClung		.1	11	do		4,500
Dec. 25	do		.2	12	do		3,150
Jan. 25	F. E. Green		5.7	13	do		1,380
25	do		6.7	13	do		720
26	do		46	14	do	1.70	325
27	do	0.54	34	15	do	1.30	168
31	do	.01	13	19	do	.30	101
Feb. 4	do	— .12	8.3	21	do	.88	175
7	do	— .09	11	25	do	.30	96
11	do	— .34	3.5	29	do	.08	68
14	do	— .24	7.0	Apr. 2	do	7.80	57
18	do	.62	74	8	do	7.76	45
21	do	.05	24	12	do	7.72	30
23	do	.57	74	17	do		28
25	do	.42	34	20	do		6.9
Mar. 1	do	.08	15	26	do		5.0
4	do	.06	12	May 16	do		1.0
7	do	.37	39	June 22	D. A. McClung		2
8	do		279				

Daily discharge, in second-feet, of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	11	16	56	5	2	16	.....	3	140	28	1	.....
2	.....	10	15	56	5	1	17	.....	3	110	28	1	.....
3	.....	9	14	56	4	1	18	.....	84	90	20	1	.....
4	.....	8	13	56	4	1	19	.....	58	101	15	1	.....
5	.....	9	11	51	4	.8	20	.....	29	200	7	1	.....
6	.....	9	20	48	3	.5	21	.....	17	175	7	1	.....
7	.....	10	40	45	3	.3	22	.....	69	140	6	1	.....
8	.....	8	270	45	3	.2	23	.....	68	120	6	1	.....
9	.....	4	72	38	3	.1	24	.....	30	104	6	.8	.....
10	.....	3	62	36	3	.....	25	7	34	97	5	.7	.....
11	.....	3	4,000	33	2	.....	26	47	28	90	5	.6	.....
12	.....	4	3,300	30	2	.....	27	21	15	80	5	.5	.....
13	.....	5	1,300	30	2	.....	28	15	10	70	5	.4	.....
14	.....	8	325	29	2	.....	29	13	.....	50	5	25	.....
15	.....	4	165	29	1	.....	30	12	.....	50	5	20	.....
							31	12	.....	50	.....	5	.....

NOTE.—No flow Oct. 1 to Nov. 8 and June 10 to Sept. 30. Mean flow for November estimated as 0.1 second-foot; December as 0.15 second-foot, and Jan. 1-24 as 0.2 second-foot.

Monthly discharge of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 299 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
November	.....	.....	[a]0.10	.....	0.00	6.0
December	.....	.....	[a].15	0.00050	.001	9.2
January	47	.....	4.25	.014	.02	261
February	84	3	19.8	.066	.07	1,100
March	4,000	11	364	1.22	1.41	22,400
April	56	5	26.4	.088	.10	1,570
May	25	.4	3.45	.012	.01	212
June	2	.0	.23	.00077	.001	13.7
The year	4,000	.0	35.3	.118	1.612	25,600

[a] Estimated.

BLACK CANYON CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 12 S., R. 2 E., 1 mile above junction with Santa Ysabel Creek and 4 miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—15.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 14, 1913, to September 30, 1918 (discharge measurements only except for 1913–14, January to March, 1917, and 1917–18).

GAGE.—Inclined staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Solid rock and boulders; appears permanent.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 25 second-feet. Gage read occasionally to hundredths. Daily discharge ascertained by applying gage height to rating table. High-water record roughly approximate; other records fair.

Discharge measurements of Black Canyon Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 19	D. A. McClung	0.70	0.2	Mar. 31	D. A. McClung	1.20	4.8
Dec. 24	do	.74	.4	May 6	F. C. Ebert	.96	1.6
31	F. C. Ebert		.6	Aug. 13	D. A. McClung	.62	.05
Mar. 8	do		14				

Daily discharge, in second-feet, of Black Canyon Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.2		0.8	1.6	6					
2									0.2		
3							2.8				
4			0.2					2.2			
5	0.5				1.6	4.2			.2	0.0	
6				.5							0.1
7	.8				4.2		2.8	1.6			
8		.2			28				6		
9						4.2	2.8			.1	
10	.2								.2		
11			.3		517			1.1			
12				.5	540	2.8			.2		
13			6		42					.1	
14			1.1				2.8	.6			.1
15				.6							
16		.3			9	3.5			.2	.2	
17	.2						2.2				
18				6	8			.6			
19						2.8			.1		
20				1.1	30		2.8			.1	.1
21			.5					.4			
22		.3			12						
23						3.2			.1	.1	
24	.2						2.2				
25			4.2	4.2				.3			
26					8	3.5			.1		
27			2.8				2.2			.1	.1
28		.2						.2			
29					7		7		.2		
30			.6			3.2					
31							2.2			.1	

SANTA MARIA CREEK NEAR RAMONA, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 13 S., R. 1 W., 7 miles below mouth of Hatfield Creek and 5½ miles west of Ramona, San Diego County.

DRAINAGE AREA.—57.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 6, 1912, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank just above control. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from cable 370 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. Concrete control just below gage at an outcropping of solid rock was rebuilt during summer of 1916. Zero flow occurs at about 1.70 feet on gage. Left bank is high; right bank sloping; one channel all stages. About 1,000 feet below gage valley narrows to a rocky gorge at proposed dam site. On this account there is natural storage in the channel during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.0 feet at 5 a. m. March 12 (discharge, 1,370 second-feet); stream dry October to December and June to September, except for a very small quantity of ground water brought to the surface at the concrete control.

1912–1918: Maximum stage recorded, 15.9 feet at 5 p. m. January 27, 1916 (discharge, 7,140 second-feet); stream practically dry for several months each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of the water-stage recorder satisfactory except March 12–15 when intake to well was closed by sand deposited by high water on March 12. Discharge for this period estimated by comparison with flow of Santa Ysabel Creek near Mesa Grande. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recordergraph, except March 8, 11, and 19, when hourly discharge was averaged. Records good.

The following discharge measurement was made by F. C. Ebert:

March 8, 1918: Gage height, 2.09 feet; discharge, 4.7 second-feet.

Daily discharge, in second-feet, of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.05	0.1	0.1	2.4	0.1	0.1
2	.....	.05	.05	.1	2.6	.1	.....
3	.....	.05	.05	.1	3.2	.1	.....
4	.....	.05	.05	.1	2.6	.1	.....
5	.....	.1	.05	.1	1.9	.1	.....
6	.....	.1	.05	.1	2.4	.1	.....
7	.....	.1	.05	.4	1.7	.1	.....
8	.....	.1	.05	8.5	1.2	.1	.....
9	.....	.1	.05	.2	1.1	.1	.....
10	.....	.1	.05	.4	1.2	.1	.....
11	.....	.1	.05	131	1.2	.1	.....
12	.....	.1	.05	670	1.3	.1	.....
13	.....	.2	.05	110	1.6	.1	.....
14	.....	.2	.05	25	1.6	.1	.....
15	.....	.2	.05	15	1.3	.1	.....
16	.....	.1	.05	8.5	.8	.1	.....
17	.....	.1	.1	6	.6	.1	.....
18	.....	.1	.3	4.8	.3	.1	.....
19	.....	.1	.1	101	.2	.1	.....
20	.....	.1	.1	72	.1	.1	.....
21	.....	.1	.1	21	.1	.1	.....
22	.....	.1	.3	12	.1	.1	.....
23	.....	.1	.2	8.5	.1	.1	.....
24	0.05	.1	.1	7.5	.1	.1	.....
25	.05	.1	.1	7	.1	.1	.....
26	.05	.2	.1	6	.1	.1	.....
27	.05	.2	.1	5.5	.1	.1	.....
28	.05	.2	.1	4.8	.1	.1	.....
29	.05	.1	.....	3.9	.1	.1	.....
30	.05	.1	.....	3.4	.1	.1	.....
31	.05	.1	.....	2.9	.....	.1	.....

NOTE.—Stream practically dry Oct. 1 to Dec. 23, and June 2 to Sept. 30. No gage-height record Mar. 12–15; discharge estimated.

Monthly discharge of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December			[a]0.05	3.1
January	0.2	0.05	.113	6.9
February	.3	.05	.091	5.1
March	670	.1	39.9	2,450
April	3.2	.1	1.01	60.1
May	.1	.1	.10	6.1
June			[a].05	3.0
The year	670	.0	3.50	2,530

[a] Estimated.

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 9, T. 11 S., R. 2 E., 1 mile below Warner dam site, 1 mile below mouth of Carrizo Creek, and 5 miles north of Mesa Grande, San Diego County.

DRAINAGE AREA.—209 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 3, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank at same location as previous gage. Staff gage was read October 1–12. Before June 13, 1912, gage was just above cut-off wall at dam site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable about 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.15 feet at 6 a. m. March 12 (discharge, 7,950 second-feet); minimum stage September 7 (discharge, 1.6 second-feet).

1911–1918: Maximum stage recorded, 18.0 feet January 27, 1916 (discharge, 58,600 second-feet); minimum stage recorded, 0.09 foot August 31, 1914 (discharge, 0.2 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changes at intervals of a few days. Mean daily gage height determined by inspecting gage-height graph. Daily discharge read from rating curve covering short periods and by interpolation between frequent discharge measurements. Records fair.

Discharge measurements of San Luis Rey River near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	A. R. Miller	2.60	2.8	Mar. 21	A. R. Miller	3.46	158
13	do	2.63	3.6	30	do	3.18	40
20	do	2.46	2.4	Apr. 6	do	3.02	37
27	do	2.60	2.6	14	do	3.04	28
Nov. 3	do	2.56	2.8	20	do	2.90	19
7	do	2.86	12	27	do	2.90	20
17	do	2.75	4.0	May 4	do	2.88	14
24	do	2.85	4.6	7	F. C. Ebert	2.85	13
Dec. 1	do	2.83	6.2	11	A. R. Miller	2.88	20
8	do	2.83	4.2	18	do	2.82	11
15	do	2.89	8.8	25	do	2.80	9.6
22	do	2.89	8.0	June 1	do	2.84	12
24	F. C. Ebert	2.89	7.8	8	do	2.68	6.2
29	A. R. Miller	2.88	7.4	15	do	2.82	4.7
Jan. 5	do	2.90	10	22	do	2.78	5.1
12	do	2.91	11	29	do	2.84	2.9
13	do	3.30	67	July 6	do	2.83	2.3
19	do	3.00	11	13	do	2.84	2.2
26	do	3.26	52	20	do	2.81	2.0
27	do	3.10	31	27	do	2.83	2.0
Feb. 2	do	2.93	9.4	Aug. 3	do	2.83	2.1
9	do	2.85	5.8	10	do	2.81	2.7
16	do	2.87	8.1	14	McClung and Miller	2.83	1.9
18	do	3.54	178	17	A. R. Miller	2.84	2.2
22	do	3.80	246	24	do	2.84	1.7
Mar. 2	do	2.95	13	31	do	2.90	3.0
7	do	3.38	111	Sept. 7	do	2.82	1.6
7	do	3.54	250	14	do	2.83	2.3
8	do	3.78	278	21	do	2.84	2.9
11	do	6.15	2,070	28	do	2.84	2.2
12	do	9.32	6,590				

Daily discharge, in second-feet, of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	2.7	6.0	8.0	9.0	14	20	17	12	2.8	2.1	2.8
2	2.5	2.8	6	9	9	13	48	16	11	2.7	2.1	2.6
3	2.5	2.8	5.5	9	8	12	51	15	10	2.6	2.1	2.4
4	2.5	5.5	5	9	7	11	40	14	9	2.5	2.1	2.2
5	2.0	6	5	9	9	10	37	14	8	2.4	2.2	2.0
6	2.8	7	4.5	9	9	58	37	13	7.5	2.3	2.3	1.8
7	2.5	8	4.5	9	9	340	36	13	7	2.3	2.4	1.6
8	2.5	8	4.2	10	9	284	34	15	6.5	2.3	2.5	1.7
9	2.5	7.5	4.5	10	6	133	31	17	6.5	2.3	2.6	1.8
10	2.5	7	5	9	9	210	29	19	6	2.2	2.7	1.9
11	2.5	6.5	5.5	9	5	1,080	28	20	5.5	2.2	2.5	2.0
12	2.5	6.5	6	11	7	4,030	34	16	5.5	2.2	2.3	2.1
13	3.6	6	7	43	8	820	28	17	5	2.2	2.1	2.2
14	3.5	5.5	8	10	8	183	28	18	4.9	2.2	1.9	2.3
15	3.3	5.5	8.5	8	8	139	26	19	4.7	2.2	2.0	2.4
16	3.1	5	8.5	9	8	110	24	20	13	2.1	2.1	2.5
17	2.9	5	8.5	8	8	100	23	15	5	2.1	2.2	2.6
18	2.7	4.9	8.5	7	132	94	21	11	4	2.0	2.2	2.7
19	2.5	4.9	8	8	96	300	20	11	29	2.0	2.1	2.8
20	2.4	4.8	8	7	73	320	19	10	19	2.0	2.0	2.9
21	2.4	4.8	8	5	66	160	15	9	6	2.0	1.9	2.9
22	2.5	4.7	8	4.0	153	115	14	10	5	2.0	1.8	2.8
23	2.5	4.7	8	4.0	36	78	15	10	6	2.0	1.7	2.7
24	2.5	4.6	8	4.0	17	74	17	10	9	2.0	1.7	2.6
25	2.6	4.8	8	27	17	60	19	8.5	10	2.0	1.9	2.5
26	2.6	5	8	55	18	54	20	8.5	5	2.0	2.1	2.4
27	2.6	5	7.5	30	17	46	20	8.5	4.0	2.0	2.3	2.3
28	2.6	5.5	7.5	15	14	46	20	14	3.5	2.0	2.4	2.2
29	2.6	5.5	7.5	12	.....	43	19	22	2.9	2.0	2.6	2.2
30	2.7	6	7.5	11	.....	40	18	18	2.9	2.0	2.8	2.2
31	2.7	.....	8	10	.....	32	.....	16	.....	2.0	3.0	.....

Monthly discharge of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.6	2.0	2.65	163
November	8	2.7	5.42	323
December	8.5	4.2	6.86	422
January	55	4.0	12.5	769
February	153	5	27.5	1,530
March	4,080	10	291	17,900
April	51	14	26.4	1,570
May	22	8.5	14.3	879
June	29	2.9	7.78	463
July	2.8	2.0	2.18	134
August	3.0	1.7	2.22	137
September	2.9	1.6	2.34	139
The year	4,080	1.6	33.7	24,400

SAN LUIS REY RIVER NEAR BONSALL, CALIF.

LOCATION.—In SW. ¼ sec. 31, T. 10 S., R. 3 W., near junction of Escondido highway with Oceanside-Bonsall road, 2 miles southwest of Bonsall, and 7 miles northeast of Oceanside, San Diego County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 26, 1916, to September 30, 1918. (Gage heights and discharge measurements only.)

GAGE.—Staff in three sections on left bank 200 feet northwest of junction of highways. Zero of gage 122.82 feet above sea level. January 3, 1918, a new staff gage was installed on left bank 200 feet below this gage and at an independent datum. Read by J. E. Clancy. Previous to August 9, 1916, datum was 0.9 foot lower.

DISCHARGE MEASUREMENTS.—Made by wading near gage at low and medium stages. High-water measurements made from highway bridge at Bonsall.

CHANNEL AND CONTROL.—Shifting sand.

DIVERSIONS.—The Escondido Mutual Water Co. diverts from San Luis Rey River about 14 miles above Pala. This water, which is stored in the Escondido reservoir (capacity, 3,120 acre-feet) about 6 miles northeast of Escondido, is used for irrigation and municipal supply at Escondido and vicinity. Water is also diverted for irrigation on the Rincon Indian Reservation. Water from Pauma Creek is used for irrigation on Pauma Indian Reservation and Pauma Rancho. Morena ditch and Pala Indian Reservation canal divert water in the vicinity of Pala for irrigation. Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Daily discharges not computed as there are not sufficient discharge measurements to define the numerous changes in channel. Gage read to hundredths once daily.

Discharge measurements of San Luis Rey River near Bonsall, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 16	D. A. McClung	1.12	12	Mar. 5	F. C. Ebert	.60	27
25	do	1.20	14	Apr. 23	D. A. McClung	.69	15
Dec. 21	F. C. Ebert	1.23	16	May 5	F. C. Ebert	.58	13
Jan. 2	D. A. McClung	.85	15	June 22	D. A. McClung	.....	2
Feb. 20	do	.84	40				

Daily gage height, in feet, of San Luis Rey River near Bonsall, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.0	1.2	1.23	.90	.64	.78	.52	.52	.40	.....	.....
2	.....	1.01	1.2	1.23	.90	.58	.76	.54	.46	.38	.....	.....
3	.....	1.0	1.21	.96	.92	.56	.78	.52	.42	.36	.....	.....
4	.....	1.01	1.2	.98	.90	.64	.80	.50	.44	.36	.....	.....
5	.....	1.0	1.18	.88	.90	.60	.76	.54	.38	.34	.....	.....
6	.....	1.2	1.19	.88	.92	.70	.70	.54	.40	.32	.....	.....
7	.....	1.13	1.2	.87	.92	.92	.76	.56	.42	.32	.....	.....
8	.....	1.12	1.2	.87	.91	1.52	.72	.70	.40	.30	.....	.....
9	.....	1.08	1.16	.85	.88	1.0	.80	.68	.40	.30	.....	.....
10	.....	1.09	1.17	.84	.86	.96	.78	.65	.39	.30	.....	.....
11	.....	1.07	1.18	.88	.76	2.0	.74	.58	.40	.30	.....	.....
12	.....	1.1	1.19	.90	.76	2.77	.78	.56	.40	.30	.....	.....
13	.....	1.09	1.23	1.16	.75	1.75	.78	.54	.38	.28	.....	.....
14	.....	1.12	1.26	1.0	.72	1.23	.75	.52	.36	.36	.....	.....
15	.94	1.11	1.28	.96	.78	1.1	.68	.48	.32	.34	.....	.....
16	.94	1.14	1.28	.93	.80	.98	.67	.46	.34	.34	.....	.....
17	.94	1.1	1.27	.89	.84	.92	.70	.46	.60	.32	.....	.....
18	.96	1.1	1.25	.90	1.18	.82	.68	.46	.58	.30	.....	.....
19	.96	1.16	1.25	.87	1.08	.74	.64	.45	.58	.30	.....	.....
20	.98	1.09	1.23	.91	.86	1.32	.66	.44	.56	.30	.....	.....
21	.98	1.1	1.22	.94	1.0	1.1	.64	.44	.54	.32	.....	.....
22	.97	1.14	1.24	.92	1.14	.96	.70	.42	.56	.30	.....	.....
23	.98	1.13	1.22	.93	1.28	.74	.72	.44	.54	.28	.....	.....
24	.98	1.2	1.22	.94	.98	.92	.72	.43	.54	.28	.....	.....
25	1.0	1.2	1.21	1.04	.76	.92	.68	.42	.52	.28	.....	.....
26	1.0	1.18	1.25	1.14	.76	.94	.70	.44	.50	.28	.....	.....
27	1.0	1.2	1.26	1.0	.74	.92	.66	.50	.46	.26	.....	.....
28	1.0	1.21	1.22	.98	.70	.92	.72	.40	.40	.....	.....	.....
29	.98	1.22	1.23	.90	.....	.86	.64	.56	.36	.....	.....	.....
30	1.0	1.2	1.22	.84	.....	.82	.58	.64	.52	.....	.....	.....
31	1.01	.....	1.23	.85	.....	.84	.....	.58	.....	.....	.....	.....

NOTE.—Stream dry Oct. 1–14 and July 28 to Sept. 30.

ESCONDIDO MUTUAL WATER CO.'S CANAL NEAR NELLIE, CALIF.

LOCATION.—In SW. ¼ NW. ¼ sec. 33, T. 10 S., R. 1 E., 500 feet below intake on San Luis Rey River, 3½ miles above Rincon Indian Reservation, 5 miles southwest of Nellie, San Diego County, and 15 miles northeast of Escondido.

RECORDS AVAILABLE.—October 1, 1896, to September 30, 1918, except that there are no records for 1901–2 and 1903–4.

GAGE.—Enameled vertical staff reading depth of water on crest of weir.

DISCHARGE MEASUREMENTS.—Made from plank across canal or by wading at various sections near gage.

CONTROL.—Rectangular weir with 6-foot crest length, 500 feet below intake. October 29, 1915, wooden weir board was replaced by concrete slab with steel plate for crest. Length of crest not changed. March, 1916, Mr. E. R. Bowen installed a weir at south portal of tunnel No. 2 and developed rating curves for the various crude weirs which had been used in previous years.

COOPERATION.—Daily-discharge record furnished by Escondido Mutual Water Co. Monthly discharge computed by United States Geological Survey.

The canal is 5.6 miles long; consists of flume, ditch, and tunnel sections constructed through a very rough, mountainous country. It discharges into a reservoir about 6 miles northeast of Escondido. The dam is 76 feet high and 380 feet long, is of the usual rock-fill type, and is faced with redwood planks. The reservoir (capacity 3,120 acre-feet) supplies water for irrigation and domestic uses at Escondido and vicinity.

Daily discharge, in second-feet, of Escondido Mutual Water Co's canal near Nellie, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16.5	16.0	8.4	8.9	11.9	16.4	23	16.0	17.0	6.2	5.0	4.2
2	16.8	16.2	9.4	8.9	11.9	15.2	23	16.0	14.0	5.5	4.2	3.9
3	15.0	15.0	9.4	8.9	11.9	13.6	23	15.0	14.0	5.5	3.9	3.9
4	16.4	.0	9.9	10.4	10.9	13.6	23	16.0	13.0	5.5	3.9	3.9
5	17.1	16.1	9.4	9.9	10.9	14.1	23	16.0	12.5	5.5	4.2	3.9
6	16.5	15.1	9.4	9.4	11.9	14.1	23	16.0	12.0	5.0	3.9	3.5
7	16.5	14.9	8.9	8.9	13.0	23	22	16.0	12.0	5.0	3.9	3.1
8	2.6	15.0	8.4	8.9	13.0	25	23	19.0	11.0	5.0	4.2	3.1
9	14.8	16.1	8.4	10.4	10.9	28	23	20	11.0	6.2	3.9	.....
10	16.2	14.9	8.4	10.9	8.9	28	23	18.0	10.5	5.5	3.9	.....
11	16.4	.0	8.9	10.4	9.9	18.8	23	19.0	10.5	5.5	3.9	.....
12	16.8	16.4	8.9	10.4	10.4	.0	23	19.0	10.0	5.5	4.2	.....
13	16.0	16.6	9.9	14.4	10.9	.0	23	16.0	8.0	5.0	3.9	.....
14	16.7	16.0	9.9	17.6	10.9	.0	23	16.0	8.0	4.6	4.2	.....
15	16.7	16.6	9.4	14.4	10.9	.0	23	14.0	8.0	4.6	4.6	.....
16	16.2	16.5	9.4	14.4	9.9	.0	22	15.0	8.0	4.0	4.6	.....
17	16.0	16.1	8.9	13.0	9.9	12.0	21	15.0	12.5	4.0	4.6	.....
18	14.9	.0	8.4	11.9	15.2	12.0	20	15.0	9.0	4.0	4.2	.....
19	15.1	14.9	8.4	10.9	23	12.0	17.5	15.0	8.0	4.6	4.2	.....
20	16.5	16.1	8.9	10.4	28	12.0	16.0	14.0	20	4.0	3.9	.....
21	.0	16.0	9.4	9.9	23	12.0	.....	14.0	11.5	4.0	3.9	.....
22	15.0	16.3	9.4	10.9	15.2	12.0	.....	14.0	9.0	3.5	3.9	.....
23	15.1	16.2	9.9	9.9	.0	20	.....	13.5	8.0	3.5	3.9	.....
24	16.8	16.5	9.9	9.9	25	22	.....	13.5	8.0	3.6	3.9	.....
25	16.9	.0	9.9	11.9	23	22	.....	13.5	8.0	4.0	3.5	.....
26	18.4	16.1	9.9	17.6	25	22	.....	13.5	7.0	4.0	3.1	.....
27	16.2	14.9	9.4	20	20	23	19.0	13.5	6.2	4.8	3.1	.....
28	.0	16.2	9.4	20	15.2	23	19.0	20	6.2	4.5	3.9	.....
29	16.4	16.0	8.9	16.4	.....	23	19.0	20	6.2	4.0	3.5	.....
30	15.1	16.2	8.9	15.2	.....	23	19.0	20	6.2	3.6	3.1	.....
31	16.4	.....	8.9	13.0	.....	23	.....	18.0	.....	3.6	3.5	.....

NOTE.—No record Apr. 21–26. No flow Sept. 9–30.

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
Octover	18.4	0.0	14.7	904
November	16.6	.0	13.8	821
December	9.9	8.4	9.19	565
January	20	8.9	12.2	750
February	28	.0	14.3	794
March	28	.0	15.6	959
April 1–20, 27–30	23	16.0	21.5	1,020
May	20	13.5	16.1	990
June	20	6.2	10.2	607
July	6.2	3.5	4.64	285
August	5.0	3.1	3.95	243
September	4.2	.0	.98	58.3
The year	.....	.....	.....	.....

SANTA ANA RIVER BASIN.

SANTA ANA RIVER NEAR MENTONE, CALIF.

LOCATION.—In SW. ¼ sec. 4, T. 1 S., R. 2 W., near mouth of canyon, one-fourth mile above Southern California Edison Co.'s power plant, half a mile above mouth of Deep Creek, and 3½ miles northeast of Mentone, San Bernardino County.

DRAINAGE AREA.—189 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1, 1896, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed September 7, 1917, on left bank at rock ledge one-fourth mile above power house, at same location and datum as vertical staff installed February 11, 1916. Previous staff, destroyed by the flood of January, 1916, was 10 feet upstream at an independent datum. Original gage was just above Warm Springs Canyon, 1½ miles upstream.

DISCHARGE MEASUREMENTS.—Made from cable just above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.54 feet at 5 p. m. March 7 (discharge, from extension of rating curve, about 6,800 second-feet); minimum stage, 0.26 foot at 5 p. m. November 29 (discharge, 0.9 second-foot).

1896–1918: Gage washed out January 27, 1916, stage not known (discharge, computed from cross-section and slope, 29,100 second-feet); minimum stage, 2.3 feet during parts of every month from October, 1913, to January, 1914 (discharge, 0.6 second-foot).

DIVERSIONS.—The Southern California Edison Co.'s canal has its intake at power plant No. 2, 2½ miles above the gage. The Greenspot pipe line diverts water for irrigation from the forebay of this canal at the Mentone power house. From the tailrace the water is carried across Santa Ana River and used for irrigation.

REGULATION.—Water is stored on Bear Creek at Bear Valley reservoir. Southern California Edison Co.'s power plants Nos. 1 and 2 are 5½ and 2¾ miles, respectively, above the Mentone plant, at the mouth of the canyon.

ACCURACY.—Stage-discharge relation not permanent during year. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for March 7, 10–12, and September 10, when hourly discharge was averaged. Record good.

Discharge measurements of Santa Ana River near Mentone, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	F. C. Ebert	0.31	1.4	Apr. 19	F. C. Ebert	1.00	8.8
Jan. 6	do	.30	1.2	May 3	do	.86	4.5
Mar. 5	do	.34	1.4	June 5	C. W. Sopp	.78	2.6
17	do	2.16	118	July 25	F. C. Ebert	.74	2.6
21	do	2.03	85	Aug. 7	do	.76	2.0
22	do	2.00	78	Sept. 4	do	.87	3.0

Daily discharge, in second-feet, of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.5	1.6	2.5	1.4	1.2	1.3	39	6.5	2.8	2.8	2.1	6.0
2	10	1.6	4.5	1.4	1.2	1.3	42	5.5	11	3.2	2.4	3.1
3	9	1.7	5.5	1.5	1.2	1.4	39	5.5	2.8	3.0	4.0	3.1
4	8.5	2.0	10	1.5	1.2	1.4	32	4.5	2.8	2.8	1.5	2.9
5	6.5	1.6	44	1.4	1.2	1.6	23	6	2.7	3.0	1.5	2.2
6	4.5	4.2	21	1.2	1.2	19	21	7.5	2.6	2.8	1.8	2.2
7	8	2.0	2.6	1.2	1.3	2,390	20	7.5	2.4	2.7	2.2	2.2
8	6	1.6	2.3	1.2	1.3	545	20	9.5	2.2	15	2.2	2.2
9	6	1.6	1.8	1.3	1.3	123	19	10	2.2	18	2.4	2.2
10	6.5	1.4	1.6	1.4	1.3	1,860	16	6	2.2	7	5.5	22
11	3.9	1.4	1.5	1.2	1.3	1,770	15	4.5	2.4	6	3.5	6
12	4.8	1.3	1.4	1.2	1.3	3,970	16	3.8	2.6	5	2.2	3.3
13	9.5	1.3	1.4	1.2	1.4	1,810	29	3.8	2.7	4.0	2.0	3.6
14	9.5	1.2	1.4	1.2	1.4	495	25	6.5	2.8	2.2	2.8	4.6
15	9.5	1.1	1.4	1.2	1.4	278	16	7	3.8	2.1	5.5	6.5
16	6	1.2	1.5	1.2	1.4	184	12	6	17	2.0	9	8
17	6	1.4	1.5	1.2	1.8	123	10	7	20	1.8	10	7.5
18	4.2	1.4	1.4	1.2	6	80	8.5	6.5	6.5	1.6	8	7
19	3.0	1.4	1.3	1.4	20	112	8.5	7	4.5	1.5	4.5	6
20	2.4	1.3	1.3	1.2	1.8	109	9	4.8	3.2	1.5	3.8	4.3
21	2.0	1.4	1.4	1.1	1.7	80	9	4.0	2.2	1.6	3.2	4.0
22	1.8	1.4	1.5	1.1	37	80	11	3.2	2.1	1.8	3.0	6.5
23	3.0	1.4	1.4	1.3	11	78	7.5	3.2	2.1	2.0	2.8	5.5
24	3.2	1.4	1.4	1.1	2.0	70	8.5	2.8	2.1	2.1	2.8	4.0
25	4.8	1.3	1.4	1.2	1.6	68	8.5	2.8	2.1	2.0	2.6	2.2
26	5	1.3	1.3	1.4	1.6	62	9	2.8	2.2	1.7	2.7	2.0
27	3.6	1.3	1.3	1.2	1.4	62	9	3.5	2.2	1.4	2.4	2.2
28	3.3	1.3	1.3	1.2	1.4	49	8.5	6.5	2.4	1.4	2.0	2.2
29	2.2	1.2	1.2	1.2	.....	39	8	6.5	2.4	1.4	1.8	2.0
30	1.8	1.2	1.3	1.2	.....	39	7.5	4.2	2.7	1.4	6	2.0
31	1.8	.....	1.4	1.2	.....	40	.....	3.0	.....	1.4	15	.....

NOTE.—No gage-height record July 10–12 and July 26; discharge estimated.

Monthly discharge of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	1.8	5.22	321
November	4.2	1.1	1.52	90.4
December	44	1.2	4.03	248
January	1.5	1.1	1.25	76.9
February	37	1.2	3.85	214
March	3,970	1.3	469	28,800
April	42	7.5	16.9	101
May	10	2.8	5.42	333
June	20	2.1	4.06	242
July	18	1.4	3.43	211
August	15	1.5	3.91	240
September	22	2.0	4.58	273
The year	3,970	1.1	44.3	31,200

Daily discharge, in second-feet, of Santa Ana River and canals near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	104	81	70	60	51	51	126	88	76	84	88	92
2	104	90	70	65	51	49	130	84	84	89	88	89
3	103	90	74	66	51	51	126	84	76	87	90	87
4	102	90	33	70	51	49	120	100	77	87	88	89
5	100	85	44	69	56	49	108	92	81	89	86	88
6	98	83	21	69	61	104	110	96	81	89	86	86
7	96	90	51	60	65	2,480	110	94	80	89	86	86
8	94	85	66	60	61	545	112	96	80	101	86	86
9	94	70	66	60	61	184	106	96	80	104	86	86
10	94	69	66	51	57	1,930	104	92	80	93	92	103
11	92	69	60	65	57	1,770	102	88	83	87	88	87
12	93	74	60	65	65	3,970	106	85	87	89	86	87
13	98	74	60	69	65	1,810	120	80	89	88	86	88
14	98	69	60	65	69	570	112	90	89	88	89	91
15	94	60	65	65	74	358	104	91	90	86	92	92
16	94	60	60	60	74	264	100	90	106	83	95	94
17	94	69	60	60	74	210	98	91	109	86	96	94
18	92	69	60	60	70	168	96	90	96	83	94	93
19	91	65	60	60	20	200	96	91	94	86	90	92
20	90	65	60	60	59	196	94	89	92	82	88	90
21	90	69	65	60	65	166	94	88	86	86	87	90
22	90	80	60	60	125	168	96	84	83	88	84	96
23	91	74	69	60	99	166	92	84	80	86	84	92
24	91	80	60	60	71	160	98	84	80	88	87	88
25	93	80	55	69	62	156	94	81	75	86	87	86
26	93	80	51	60	59	150	93	84	72	83	87	83
27	92	80	55	55	57	136	93	88	83	79	86	83
28	91	74	60	55	51	126	92	90	83	85	83	86
29	90	74	60	55	.....	126	92	90	83	85	83	86
30	90	74	60	51	.....	126	88	88	84	87	92	86
31	85	.....	55	51	.....	128	.....	81	.....	85	104	.....

NOTE.—See page 40 for flow of Greenspot pipe line and page 39 for flow of Southern California Edison Co.'s canal.

Monthly discharge of Santa Ana River and canals near Mentone, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 189 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	104	85	94.2	0.498	0.57	5,790
November	90	60	75.7	.401	.45	4,500
December	74	21	58.6	.310	.36	3,600
January	70	51	61.1	.323	.37	3,760
February	125	20	63.6	.337	.35	3,530
March	3,970	49	536	2.84	3.27	33,000
April	130	88	104	.550	.61	6,190
May	100	81	88.7	.469	.54	5,450
June	109	72	84.6	.448	.50	5,030
July	104	79	87.4	.462	.53	5,370
August	104	83	88.5	.468	.54	5,440
September	103	83	89.2	.472	.53	5,310
The year	3,970	20	190	.635	8.62	87,000

SOUTHERN CALIFORNIA EDISON CO.'S CANAL[1] AND GREENSPOT PIPE LINE NEAR MENTONE, CALIF.

LOCATION.—At Southern California Edison Co's. power plant at mouth of canyon, 2¾ miles below intake on Santa Ana River and 3 miles northeast of Mentone, San Bernardino County.

RECORD AVAILABLE.—1896 to September 30, 1918.

DISCHARGE.—Computed from records showing kilowatt output of power plant.

EXTREMES OF DISCHARGE.—1896–1918: Maximum mean daily discharge recorded, 97 second-feet March 16, 1905; no flow during short periods nearly every year.

DIVERSIONS.—Water diverted from the forebay by the Greenspot pipe line must be added to give total flow of canal. From 1903 to 1911 pipe line diverted from canal above forebay and no discharge was reported. The present pipe line was put in operation September 7, 1911.

ACCURACY.—The record for power canal is computed on the assumption that 1 second-foot develops 18.9 kilowatts.

The intake of this canal is at Southern California Edison Co.'s power plant No. 2, 2¾ miles above the Mentone plant at the mouth of the canyon. All the water, except that taken by the Greenspot line, is first used for development of power; after it leaves the Mentone power house, it is conducted across Santa Ana River in a flume and discharged into a lined canal from which it is distributed for irrigation. Before it enters the irrigation canal it passes through three power plants.

Daily discharge, in second-feet, of Southern California Edison Co's. canal near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	70	59	50	45	45	85	72	64	72	77	77
2	85	79	59	55	45	43	85	69	64	77	77	77
3	85	79	59	55	45	45	85	69	64	75	77	75
4	85	79	20	59	45	43	85	86	65	75	77	77
5	85	74	0	59	50	43	83	77	69	77	75	77
6	85	70	0	59	55	85	85	80	69	77	75	75
7	79	79	42	50	59	85	85	77	69	77	75	75
8	79	74	55	50	55	0	85	77	69	77	75	75
9	79	59	55	50	55	61	80	77	69	77	75	75
10	79	59	55	41	50	69	80	77	69	77	77	72
11	79	59	50	55	50	0	80	75	72	72	75	72
12	79	64	50	55	55	0	83	72	75	75	75	75
13	79	64	50	59	55	0	83	67	77	75	75	75
14	79	59	50	55	59	75	80	75	77	77	77	77
15	79	50	55	55	64	77	80	75	75	75	77	77
16	79	50	50	50	64	77	80	75	80	72	77	77
17	79	59	50	50	64	85	80	75	80	75	77	77
18	79	59	50	50	56	85	80	75	80	72	77	77
19	79	55	50	50	0	85	80	75	80	75	77	77
20	79	55	50	50	53	85	77	75	80	72	75	77
21	79	59	55	50	59	83	77	75	75	75	75	77
22	79	70	50	50	83	85	77	72	72	77	72	80
23	79	64	59	50	83	85	77	72	69	75	72	77
24	79	70	50	50	64	88	80	72	69	77	75	75
25	79	70	45	59	56	85	77	69	64	75	75	75
26	79	70	41	50	53	85	75	72	61	72	75	72
27	79	70	45	45	51	72	75	75	72	69	75	72
28	79	64	50	45	45	75	75	75	72	75	72	75
29	79	64	50	45	.....	85	75	75	72	75	72	75
30	79	64	50	45	.....	85	72	75	72	77	77	75
31	74	.....	45	45	.....	85	.....	69	.....	75	80	.....

[1] Canal owned by Pacific Light & Power Corporation previous to 1917.

Monthly discharge of Southern California Edison Co's. canal near Mentone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	85	74	80.0	4,920
November	79	50	65.4	3,890
December	59	0	46.7	2,870
January	59	41	51.3	3,150
February	83	0	54.2	3,010
March	88	0	64.5	3,970
April	85	72	80.0	4,760
May	86	67	74.2	4,560
June	80	61	71.6	4,260
July	77	69	74.9	4,610
August	80	72	75.5	4,640
September	80	72	75.6	4,500
The year	88	0	67.9	49,100

Daily discharge, in second-feet, of Greenspot pipe line near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	9	9	9	4.6	4.6	2.5	9	9	9	9	9
2	9	9	6.5	9	4.6	4.6	2.5	9	9	9	9	9
3	9	9	9	9	4.6	4.6	2.5	9	9	9	9	9
4	9	9	3.0	9	4.6	4.6	2.5	9	9	9	9	9
5	9	9	.0	9	4.6	4.6	2.5	9	9	9	9	9
6	9	9	.0	9	4.6	.0	4.5	9	9	9	9	9
7	9	9	6.4	9	4.6	.0	4.5	9	9	9	9	9
8	9	9	9	9	4.6	.0	7.5	9	9	9	9	9
9	9	9	9	9	4.6	.0	7.5	9	9	9	9	9
10	9	9	9	9	5.5	.0	7.5	9	9	9	9	9
11	9	9	9	9	5.5	.0	7.5	9	9	9	9	9
12	9	9	9	9	8.5	.0	7.5	9	9	9	9	9
13	9	9	9	9	8.5	.0	7.5	9	9	9	9	9
14	9	9	9	9	8.5	.0	7.5	9	9	9	9	9
15	9	9	9	9	8.5	2.5	7.5	9	9	9	9	9
16	9	9	9	9	8.5	2.5	7.5	9	9	9	9	9
17	9	9	9	9	8.5	2.5	7.5	9	9	9	9	9
18	9	9	9	9	8.5	2.5	7.5	9	9	9	9	9
19	9	9	9	9	.0	2.5	8	9	9	9	9	9
20	9	9	9	9	4.6	2.5	8	9	9	9	9	9
21	9	9	9	9	4.6	2.5	8	9	9	9	9	9
22	9	9	9	9	4.6	2.5	8	9	9	9	9	9
23	9	9	9	9	4.6	2.5	8	9	9	9	9	9
24	9	9	9	9	4.6	2.5	9	9	9	9	9	9
25	9	9	9	9	4.6	2.5	9	9	9	9	9	9
26	9	9	9	9	4.6	2.5	9	9	9	9	9	9
27	9	9	9	9	4.6	2.5	9	9	9	9	9	9
28	9	9	9	9	4.6	2.5	9	9	9	9	9	9
29	9	9	9	9	.....	2.5	9	9	9	9	9	9
30	9	9	9	4.6	.....	2.5	9	9	9	9	9	9
31	9	.....	9	4.6	.....	2.5	.....	9	.....	9	9	.....

Monthly discharge of Greenspot pipe line near Mentone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	9	9.0	553
November	9	9	9.0	536
December	9	.0	8.06	496
January	9	4.6	8.72	536
February	8.5	.0	5.48	304
March	4.6	.0	2.11	130
April	9	2.5	6.90	411
May	9	9	9.0	553
June	9	9	9.0	536
July	9	9	9.0	553
August	9	9	9.0	553
September	9	9	9.0	536
The year	9	.0	7.87	5,700

NOTE.—Computed by engineers of United States Geological Survey.

MILL CREEK AT FOREST HOME,[1] CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 13, T. 1 S., R. 1 W., at Forest Home, San Bernardino County, 2½ miles below Falls Creek, 4 miles above Mountain Home Creek, and 14 miles east of Redlands.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 23, 1903, to September 30, 1918.

DISCHARGE.—Determined from flow in power canal plus flow over diverting dam. Current-meter measurements have been made on canal. Record of flow over diverting dam is roughly approximate.

EXTREMES OF DISCHARGE.—1903–1918: Maximum mean daily discharge, 2,200 second-feet March 7, 1918 (no record for flood of January, 1916); minimum mean daily discharge, 7.0 second-feet November 19 and 20, 1904.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Two sets of observations recorded each day at 6 a. m. and 6 p. m. Records for periods in which total flow of Mill Creek is diverted into power canal considered good; those for higher stages roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

[1] Akers Camp on map of San Gorgonio quadrangle, U. S. Geological Survey.

Daily discharge, in second-feet, of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12.7	11.8	11.3	10.0	9.4	10.5	37	39	35	26.5	21.2	17.0
2	12.6	11.8	11.2	10.0	9.4	10.5	37	39	38.5	25.8	21.2	15.7
3	12.8	11.6	11.0	10.0	9.3	10.7	37.5	[a]39	35	29.5	20.6	15.9
4	12.4	11.6	11.0	10.0	9.2	10.7	37.5	39	35	23.2	20.6	22.3
5	12.4	11.6	11.0	9.9	9.2	10.7	37.5	40	34.5	30.9	20.7	15.9
6	12.4	15.0	11.0	10.0	9.1	32.5	37	40	34	22.8	20.6	16.2
7	12.2	11.6	10.8	9.6	9.8	2,200	37	40	34	23.2	20.5	15.9
8	12.2	11.9	10.8	9.6	9.2	70	37	40	34	24.8	[a]21	16.0
9	12.2	12.2	10.8	9.6	9.0	13.3	37	40	34	29.5	21.6	16.1
10	12.2	12.1	10.8	7.5	9.1	755	37	40	34	30	21.8	15.8
11	12.2	11.9	10.8	9.3	9.1	320	37	39	34	27	20.5	15.8
12	12.2	11.9	10.8	9.6	9.1	1,750	37	38	32.5	27.5	20.4	16.1
13	12.3	11.8	10.8	9.8	9.1	120	39	38	[a]32	27.8	20.4	15.7
14	12.2	11.9	10.8	9.4	9.1	110	40	38	31.5	27.5	[a]20.3	15.7
15	12.2	11.8	10.8	9.4	9.1	75	40	38	[b]31.5	26.5	20.2	15.6
16	12.5	11.7	10.8	9.6	9.1	60	40	37.5	40	26.5	20.1	15.4
17	12.3	11.6	10.8	9.8	9.0	50	40	37.5	39	26.2	20.1	15.5
18	12.2	11.6	10.8	9.8	8.0	45	[a]40	37.5	39	26	19.8	15.5
19	12.3	11.6	10.8	9.8	8.4	48	40	37	38	25.5	19.4	15.2
20	12.1	11.5	10.6	10.0	9.7	47	40	37.7	37	24.5	18.9	14.2
21	12.1	11.5	10.4	9.1	10.7	48	40	37.5	35	24	18.3	15.5
22	12.2	11.6	10.4	11.3	27.0	46	40	37.2	35.5	24	18.1	15.9
23	11.9	11.5	10.3	9.1	12.8	45	40	36.5	35	24	18	15.2
24	11.9	11.9	10.4	9.1	11.1	41	40	36.5	33.8	24	17.6	15.6
25	11.9	11.6	10.3	10.5	10.7	41	40	36.5	33.8	24	17.9	15.6
26	11.8	11.6	10.4	10.2	10.4	42	40	36.5	32	22.6	18.2	15.2
27	11.8	11.5	10.3	9.2	10.3	42	40	36.5	30	23.1	18.6	15.6
28	11.8	11.6	10.2	9.6	10.2	40	40	36.5	29.5	22.2	18.5	15.4
29	11.8	11.3	10.2	9.6	.....	36	40	37	28.2	21.6	25.9	15.6
30	11.8	11.3	10.1	9.6	.....	37	40	36.5	27	21.5	22	15.2
31	11.8	.....	10.0	9.5	.....	37	.....	35	.....	21.2	17.8	.....

[a] Interpolated. [b] Estimated same as day before.

Monthly discharge of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12.8	11.8	12.2	750
November	15.0	11.3	11.8	702
December	11.3	10.0	10.7	658
January	11.3	7.5	9.66	594
February	27.0	8.0	10.2	566
March	2,200	10.5	200	12,300
April	40	37	38.8	2,310
May	40	35	37.9	2,330
June	40	27	34.1	2,030
July	30.9	21.2	25.3	1,560
August	25.9	17.6	20.0	1,230
September	22.3	14.2	15.9	946
The year	2,200	7.50	35.9	26,000

NOTE.—Computed by engineers of U. S. Geological Survey.

LYTLE CREEK NEAR SAN BERNARDINO, CALIF.

LOCATION.—In NW. ¼ sec. 26, T. 2 N., R. 6 W., at Southern California Edison Co.'s diversion dam, below junction of North and Middle forks of Lytle Creek, in Angeles National Forest, 3 miles above mouth of canyon and 14 miles northwest of San Bernardino, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1904, to September 30, 1918.

GAGE.—Watson water-stage recorder in pool above weir in power canal.

DISCHARGE.—Computed by combining determinations of flow in power canal with those of flow over diverting dam; discharge of power canal is measured near intake by an 8-foot steel plate rectangular weir; flow over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1904–1918: Maximum mean daily discharge, 4,750 second-feet January 18, 1916; minimum mean daily discharge reported, 5.1 second-feet September 30 and October 3, 1904.

ACCURACY.—Daily discharge is mean of two observations recorded each day at 6 a. m. and 6 p. m. Record for periods in which total flow of Lytle Creek is diverted into power canal, good; for those in which discharge exceeds 23 second-feet (capacity of canal) they are roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

Daily discharge, in second-feet, of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22.1	22.2	22.6	22.2	22.0	32.6	60	34	34	29.8	28.6	28.6
2	22.2	22.2	22.6	21.9	22.0	33.8	60	34	34	29.8	28.6	28.6
3	22.2	22.2	22.4	23.4	22.0	30.8	60	34	34	29.8	28.6	28.6
4	22.2	22.2	22.5	22.2	21.7	28.8	60	34	34	29.8	28.6	28.6
5	22.2	22.2	22.2	22.2	21.6	29.6	55	34	34	29.8	28.6	28.6
6	22.2	22.2	22.2	22.2	21.8	46.5	50	34	34	29.8	28.6	28.6
7	22.2	22.4	22.6	22.1	15.7	62.0	50	34	33	29.8	28.6	28.6
8	22.2	22.2	22.1	22.0	22.2	346	50	34	32	29.8	28.6	28.6
9	22.2	22.2	23.9	22.1	22.5	147	50	34	32	29.8	28.6	28.6
10	22.2	23.5	22.2	21.8	22.4	300	67	34	32	29.4	28.6	28.6
11	22.2	23.7	22.2	22.2	22.1	650	62	34	32	29.0	28.6	28.6
12	22.2	24.1	22.2	22.2	21.8	550	62	34	32	29.0	28.6	28.6
13	22.2	23.4	22.2	19.9	18.6	321	62	34	32	29.0	28.6	28.6
14	22.2	23.4	22.2	22.3	16.3	222	62	34	32	28.8	28.6	28.8
15	22.2	22.8	22.2	22.1	16.2	153	62	34	32	28.6	28.6	28.8
16	22.2	22.8	22.2	22.0	20.0	122	62	34	32	28.6	28.6	29.1
17	22.2	22.2	22.2	22.0	20.0	112	62	34	32	28.6	28.6	28.9
18	22.2	22.4	22.1	22.0	19.5	80	62	34	32	28.6	28.6	28.6
19	22.2	23.0	22.2	21.4	20.3	80	62	34	32	28.6	28.6	28.6
20	22.2	22.8	22.2	20.7	19.3	80	62	34	32	28.6	28.6	28.6
21	22.2	22.8	22.2	21.2	22.6	102	62	34	32	28.6	28.6	28.6
22	22.2	22.6	21.1	21.4	22.2	87	62	34	32	28.6	28.6	28.6
23	22.2	22.6	18.6	21.4	29.7	82	62	34	32	28.6	28.6	28.6
24	22.2	22.8	[a]18.9	20.8	22.6	60	62	34	32	28.6	28.6	28.6
25	22.2	22.7	19.1	21.0	22.8	60	62	34	30	28.6	28.6	28.6
26	22.2	22.8	18.8	19.6	21.8	60	62	34	30	28.6	28.6	28.6
27	22.2	22.6	17.2	21.8	43.4	60	62	34	29.7	28.6	28.6	28.6
28	22.2	22.9	18.8	21.4	39.4	60	62	34	29.7	28.6	28.6	28.6
29	22.2	23.0	22.1	21.4	.....	60	62	34	29.8	28.6	28.6	28.6
30	22.2	23.1	22.2	21.4	.....	60	62	34	29.8	28.6	28.6	28.6
31	22.2	.....	22.2	22.3	.....	60	.....	34	.....	28.6	28.6	.....

[a] Interpolated.

Monthly discharge of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	22.2	22.1	22.2	1,370
November	24.1	22.2	22.7	1,350
December	23.9	17.2	21.6	1,330
January	23.4	19.6	21.7	1,330
February	43.4	15.7	22.6	1,260
March	650	28.8	135	8,300
April	67	50	60.1	3,580
May	34	34	34.0	2,090
June	34	29.7	32.0	1,900
July	29.8	28.6	29.0	1,780
August	28.6	28.6	28.6	1,760
September	29.1	28.6	28.6	1,700
The year	650	15.7	38.3	27,800

NOTE.—Discharge computed by engineers of U. S. Geological Survey.

SAN JACINTO RIVER NEAR ELSINORE, CALIF.

LOCATION.—Near east line of sec. 9, T. 6 S., R. 4 W., 2¼ miles above junction with Elsinore Lake (low-water stage), one-fourth mile above highway crossing, and 2 miles southeast of Elsinore, Riverside County.

DRAINAGE AREA.—717 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections on right bank about one-fourth mile above highway crossing. Read by W. L. Wilhite.

DISCHARGE MEASUREMENTS.—Made from railway bridge three-fourths mile below gage or by wading below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.28 feet at 10 a. m. March 12 (discharge, 750 second-feet); stream dry for several months during year.

1916–1918: Maximum stage recorded, 19.0 feet at 11 a. m. January 28, 1916 (discharge, 14,000 second-feet); stream dry for several months each year.

DIVERSIONS.—The Temescal Water Co. diverts water for irrigation above the station. Water is also diverted above San Jacinto for irrigation.

REGULATION.—Water is stored for irrigation at Hemet reservoir on South Fork of San Jacinto River.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined below 500 second-feet; it is slight revision of curve for 1916–17. Gage read to hundredths about every other day. Daily discharge ascertained by applying gage height to rating table; interpolated for days on which gage was not read. Records good.

Discharge measurements of San Jacinto River near Elsinore, Calif., during the year ending Sept. 30, 1918.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	1.19	0.4	Mar. 17	1.98	50
Mar. 5	1.17	.6	22	2.00	51

Daily discharge, in second-feet, of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.3	1.2	1.6	1.2	0.5	0.2	0.2
2	.....	.4	1.2	1.6	1.2	.4	.2	.2
3	.....	.4	1.2	1.5	.8	.4	.2	.2
4	.....	.4	1.3	1.3	.4	.4	.2	.2
5	.....	.4	1.4	1.2	.4	.4	.2	.2
6	.....	.4	1.4	1.2	a 2.0	.4	.2	.2
7	.....	.4	1.4	1.6	a 4.0	.4	.2	.1
8	.....	.4	1.4	1.5	6.5	.4	.2	.1
9	.....	.4	1.4	1.4	a 20	.3	.2	.....
10	.....	.4	1.4	1.5	a 40	.2	.2	.....
11	.....	.5	1.6	1.6	61	.2	.2	.....
12	.....	.5	1.3	1.6	750	.2	.2	.....
13	0.2	.5	1.0	1.6	750	.2	.2	.....
14	.2	.5	.7	1.6	705	.2	.2	.....
15	.2	.5	.5	1.6	266	.2	.2	.....
16	.2	.6	.6	1.6	158	.2	.2	.....
17	.2	.7	.5	3.3	49	.4	.2	.....
18	.2	.7	.5	5.0	31	.6	.2	.....
19	.2	.7	.5	3.5	141	.4	.2	.....
20	.2	.7	.5	2.1	251	.3	.2	.....
21	.3	.7	.6	1.6	146	.3	.2	.....
22	.3	.7	.6	1.6	51	.2	.2	.....
23	.3	.7	.6	1.6	47	.2	.2	.....
24	.3	1.0	.6	1.6	46	.2	.2	.....
25	.3	1.2	.7	1.6	27	.2	.2	.....
26	.3	1.2	2.1	1.6	8.5	.2	.2	.....
27	.3	1.2	2.1	1.5	6.5	.2	.2	.....
28	.3	1.2	2.1	1.3	3.6	.2	.2	.....
29	.3	1.2	2.1	.....	.7	.2	.2	.....
30	.3	1.2	1.6	.....	.6	.2	.2	.....
31	.....	1.2	1.2	.....	.5	.....	.2	.....

a Estimated.

NOTE.—No flow Oct. 1 to Nov. 12 and June 9 to Sept. 30.

Monthly discharge of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	0.3	0.0	0.15	8.9
December	1.2	.3	.69	42.4
January	2.1	.5	1.14	70.1
February	5	1.2	1.80	100
March	750	.4	115	7,070
April	.6	.2	.29	17.3
May	.2	.2	.20	12.3
June	.2	.0	.05	3.0
The year	750	.0	10.2	7,320

ELSINORE LAKE AT ELSINORE, CALIF.

LOCATION.—A short distance southeast of outlet at Elsinore, Riverside County.

RECORDS AVAILABLE.—December 1, 1915, to September 30, 1918.

GAGE.—Vertical staff in several sections on northeast shore a short distance above outlet; read by W. L. Wilhite. Zero of gage at elevation 1,242.11 feet above mean sea level. Datum was raised 0.06 foot May 10, 1918.

Daily elevation, in feet, of Elsinore Lake at Elsinore, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		57.1	57.0			58.2	57.8			
2									56.6	
3		57.1			58.5					
4			57.0			58.2	57.7	57.2		
5		57.1		57.2	58.6		57.7			56.0
6								57.2	56.5	
7			57.0				57.7	57.2		55.9
8		57.1			58.6	58.2				
9			57.0	57.4				57.2	56.5	
10					58.5	58.2	57.6	57.2		55.9
11		57.0	57.0	57.2						
12					58.5			57.0	56.4	
13				58.0		58.1				55.8
14			57.0		58.4					
15		57.1					57.6			
16			57.0	58.2				57.0	56.4	
17			57.0	58.4		58.0				55.8
18							57.5			
19		57.0			58.4	57.9		56.9	56.2	
20	57.2		57.0							
21		57.0					57.5	56.9		55.7
22				58.6					56.2	
23			57.1	58.6	58.3					
24										55.6
25			57.2	58.7		57.9	57.4	56.8		
26	57.2	57.1			58.3					55.5
27				58.7					56.1	
28		57.0	57.2			57.8				
29	57.1					57.8	57.3	56.7		
30	57.1	57.0		58.8					56.1	
31										

NOTE.—Add 1,200 feet to obtain mean sea level.

SAN ANTONIO CREEK NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ SE.¼ sec. 36, T. 2 N., R. 8 W., at highway bridge half a mile above Southern California Edison Co.'s power house (Sierra plant), 4 miles above mouth of canyon, and 8 miles northeast of Claremont, Los Angeles County.

DRAINAGE AREA.—16.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1917, to September 30, 1918. (Discharge measurements only May 31 to Sept. 4, 1916.)

GAGE.—Gurley graph water-stage recorder on left bank at north end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading near gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; subject to shift during high stages. One channel except at extreme floods when left bank is overflowed.

EXTREMES OF DISCHARGE.—1917–18: Maximum stage, from water-stage recorder, 4.00 feet at 3 p. m. March 7, 1918 (discharge, 362 second-feet); minimum stage, from water-stage recorder, 0.93 foot at 4 p. m. August 26, 1918 (discharge, 0.5 second-foot).

DIVERSIONS.—The Southern California Edison Co. diverts water for power development above the station. (See p. 49.)

REGULATION.—None except as indicated above.

ACCURACY.—Stage-discharge relation not permanent during year. On account of slight change in the control three fairly well-defined rating curves were used during the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for March 7 and 10 when hourly discharge was averaged. Records good.

COOPERATION.—Southern California Edison Co. furnished attendant for water-stage recorder.

Discharge measurements of San Antonio Creek near Claremont, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	H. J. Tompkins	0.56	0.6	Apr. 18	C. W. Sopp	1.82	28
Dec. 15	do	.58	.7	May 8	H. J. Tompkins	1.73	19
Feb. 25	do	.72	2.7	14	do	1.60	15
Mar. 8	C. W. Sopp	2.47	68	23	C. W. Sopp	1.48	11
9	H. J. Tompkins	2.02	39	June 1	H. J. Tompkins	1.34	5.8
14	do	3.14	165	21	do	1.04	1.8
21	F. C. Ebert	2.39	68	July 19	C. W. Sopp	.98	.85
30	H. J. Tompkins	2.08	39	Aug. 28	H. J. Tompkins	.94	.7
Apr. 4	C. W. Sopp	2.06	41	Sept. 15	F. C. Ebert	.96	.6
11	H. J. Tompkins	1.90	35				

Daily discharge, in second-feet, of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	0.9	0.9	0.8	0.8	2.2	42	22	7	0.9	0.8	0.7
2	1.1	.9	.9	.8	.8	1.8	41	22	6.5	.9	.8	.7
3	1.1	.9	.9	.8	.8	1.8	41	22	6	.9	.8	.7
4	1.1	.9	.9	.8	.8	1.7	41	20	5.5	.9	.8	.7
5	1.1	1.0	.9	.8	.8	1.8	41	21	4.9	.9	.8	.7
6	1.2	1.2	.9	.8	.8	2.4	40	21	4.5	.9	.8	.7
7	1.2	1.1	.9	.7	.8	133	37	20	4.3	.9	.8	.7
8	1.1	1.1	.8	.7	.8	96	35	20	3.9	.9	.8	.7
9	1.1	1.0	.8	.8	.9	45	32	20	3.7	.9	.8	.7
10	1.0	.9	.8	.8	.9	94	31	20	3.5	.9	.8	.7
11	1.1	.9	.8	.8	.9	179	30	23	3.0	.9	.8	.7
12	1.1	.9	.7	.8	.9	184	30	18	2.5	.9	.8	.7
13	1.2	.9	.7	.8	.9	175	31	17	2.3	.9	.8	.8
14	1.2	.9	.8	.9	.9	165	30	15	2.1	.8	.8	.8
15	1.1	.9	.8	.9	.9	150	29	15	1.7	.8	.8	.8
16	1.1	.9	.8	.9	.9	130	27	14	2.0	.8	.8	.8
17	1.1	.9	.8	.9	1.1	110	26	14	1.7	.8	.8	.8
18	1.1	.9	.8	.9	1.1	96	25	13	1.7	.8	.8	.8
19	1.0	.9	.8	.9	1.1	89	26	12	1.7	.8	.8	.8
20	1.0	.9	.8	.9	1.1	88	25	11	1.7	.8	.8	.8
21	.9	.9	.8	.9	2.8	69	25	11	1.5	.8	.8	.8
22	.9	.9	.8	.8	10	65	24	11	1.4	.8	.8	.8
23	.8	.9	.8	.8	7	61	24	10	1.2	.8	.8	.8
24	.8	.9	.8	.8	3.6	57	24	10	1.2	.8	.8	.8
25	.7	.9	.8	1.1	3.4	53	24	10	1.1	.8	.7	.8
26	.8	.9	.8	1.0	3.8	50	24	9.5	1.1	.8	.6	.8
27	.8	.9	.8	1.0	3.4	49	24	9	1.0	.8	.6	.9
28	.8	.9	.8	.9	2.7	46	25	10	.9	.8	.6	.9
29	.9	.9	.8	.8	.....	45	24	9.5	.9	.8	.7	.9
30	.9	.9	.8	.8	.....	43	24	8.5	.9	.8	.7	.8
31	.8	.....	.8	.8	.....	43	.....	7.5	.....	.8	.7	.....

NOTE.—No gage-height record July 2–5; discharge interpolated.

Monthly discharge of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.2	0.8	1.00	61.5
November	1.2	.9	.93	55.3
December	.9	.7	.82	50.4
January	1.1	.7	.85	52.3
February	10	.8	1.95	108
March	184	1.7	75.1	4,620
April	42	24	30.1	1,790
May	23	7.5	15.0	922
June	7	.9	2.71	161
July	.9	.8	.84	51.6
August	.8	.6	.77	47.3
September	.9	.7	.77	45.8
The year	184	.6	11.0	7,970

Daily discharge, in second-feet, of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	10	10	9	8	12	61	41	26	20	16	12
2	12	10	10	9	8.5	11	60	41	26	20	15	12
3	11	10	10	9	8.5	11	60	41	25	19	15	12
4	12	10	10	9	8.5	11	60	39	25	19	15	12
5	12	10	10	9	8.5	12	60	40	24	19	15	12
6	11	12	10	9	8.5	15	59	40	24	19	15	12
7	11	11	10	8.5	8.5	153	56	39	24	19	15	12
8	11	11	10	9	8.5	116	54	39	23	19	15	12
9	12	10	10	8.5	8.5	65	51	39	23	18	15	12
10	11	10	9.5	9	8.5	114	50	39	23	18	15	12
11	11	10	10	9	8.5	199	49	42	22	18	14	12
12	11	10	9.5	9	8.5	204	49	37	22	18	14	12
13	11	10	9.5	9	8.5	195	50	36	22	18	14	12
14	12	10	9.5	9	8.5	185	49	34	22	18	14	12
15	12	10	10	9	8.5	170	48	34	21	18	14	12
16	12	10	9.5	9	8.5	150	46	33	21	17	14	12
17	11	10	9.5	8.5	8.5	130	45	33	21	17	14	12
18	11	10	9.5	9	9	116	44	32	21	17	14	12
19	11	10	9.5	9	8.5	109	45	31	21	17	14	11
20	11	10	9.5	9	9	108	44	30	21	17	14	11
21	11	10	9.5	8.5	13	89	44	30	21	16	13	11
22	10	10	9	8.5	26	85	43	30	21	16	14	11
23	10	10	9.5	9	18	81	43	29	20	17	14	11
24	10	10	9	8.5	14	77	43	29	20	16	13	11
25	11	10	9	9.5	14	73	43	29	20	16	13	11
26	11	10	9	9	14	70	43	29	20	16	13	11
27	11	10	9	9	14	69	43	28	20	16	13	12
28	10	10	9	9	12	66	44	29	20	16	13	12
29	10	10	9	8.5	.....	65	43	29	20	16	13	11
30	10	10	9	8.5	.....	63	43	28	20	15	12	11
31	10	.....	9	8.5	.....	63	.....	27	.....	15	13	.....

Monthly discharge of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 16.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	12	10	11.0	0.651	0.75	676
November	12	10	10.1	.598	.67	601
December	10	9	9.53	.564	.65	586
January	9	8.5	8.87	.525	.61	545
February	26	8	10.6	.627	.65	569
March	204	11	93.1	5.51	6.35	5,720
April	61	43	49.1	2.91	3.25	2,920
May	42	37	34.1	2.02	2.33	2,100
June	26	20	22.0	1.30	1.45	1,310
July	20	15	17.4	1.03	1.19	1,070
August	16	12	14.0	.828	.95	861
September	12	11	11.7	.692	.77	696
The year	204	8	24.4	1.44	19.62	17,700

SOUTHERN CALIFORNIA EDISON CO.'S CANAL[1] NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ sec. 1, T. 1 N., R. 8 W., at weir in tailrace of Sierra power house, on San Antonio Creek, 1½ miles below intake and about 8 miles northeast of Claremont, Los Angeles County.

RECORDS AVAILABLE.—January 1, 1917, to September 30, 1918.

GAGE.—Hook gage, which indicates head on weir; read by B. F. Campbell, operator at power house.

DISCHARGE.—Computed from head on 10-foot rectangular weir.

ACCURACY.—Gage is read at 8 a. m. and 4 p. m. Discharge computed from weir table by observer. Records good.

COOPERATION.—Discharge record furnished by Southern California Edison Co.

This canal diverts water from San Antonio Creek in SE. ¼ sec. 25, T. 2 N., R. 8 W., 1 mile above gaging station on San Antonio Creek near Claremont. The water is used for power development at Sierra power house, in NW. ¼ sec. 1, T. 1 N., R. 8 W., and then returned directly to creek.

[1]Canal owned by Pacific Light & Power Corporation previous to 1917.

Daily discharge, in second-feet, of Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11.2	9.5	8.9	8.2	7.4	9.5	19.4	19.4	19.4	18.6	15.1	11.6
2	11.2	9.4	9.1	8.2	7.8	9.4	19.4	19.4	19.4	18.7	14.6	11.5
3	10.2	9.4	9.1	8.2	7.8	9.4	19.4	19.4	19.4	18.5	14.2	11.7
4	10.7	9.5	9.0	8.1	7.7	9.5	19.4	19.4	19.4	18.3	14.1	11.3
5	10.4	9.5	9.1	8.2	7.8	10.0	19.4	19.4	19.4	18.3	14.3	11.2
6	10.1	10.5	9.0	8.1	7.6	12.2	19.4	19.4	19.4	18.1	13.8	11.3
7	10.1	10.0	9.0	8.0	7.8	19.6	19.4	19.4	19.4	17.8	14.1	11.2
8	10.1	9.6	9.0	8.1	7.6	19.7	19.4	19.4	19.4	17.8	14.0	11.0
9	10.5	9.5	9.0	7.9	7.6	20.3	19.4	19.4	19.4	17.6	14.0	11.2
10	10.1	9.5	8.9	8.0	7.6	20.4	19.4	19.4	19.4	17.4	13.8	11.0
11	10.1	9.6	9.0	8.1	7.6	20.3	19.4	19.4	19.4	17.4	13.4	11.0
12	10.3	9.5	9.0	8.0	7.6	20.2	19.4	19.4	19.4	17.3	13.5	11.0
13	10.2	9.5	8.9	8.1	7.6	20.2	19.4	19.4	19.4	17.1	13.4	11.0
14	10.4	9.3	8.8	8.0	7.6	20.3	19.4	19.4	19.4	17.4	13.4	10.9
15	10.4	9.5	9.0	8.1	7.6	20.1	19.4	19.4	19.4	17.0	13.6	11.2
16	10.4	9.5	8.8	8.1	7.5	19.6	19.4	19.4	19.4	16.5	13.5	11.1
17	10.2	9.4	8.6	7.8	7.6	19.5	19.4	19.4	19.4	16.5	13.3	10.8
18	10.2	9.2	8.5	7.9	7.8	19.6	19.4	19.4	19.4	16.0	13.2	10.8
19	10.2	9.0	8.5	7.9	7.6	19.6	19.4	19.4	19.4	15.9	13.1	10.6
20	10.0	9.0	8.7	7.9	7.9	19.6	19.4	19.4	19.4	16.0	13.0	10.6
21	9.8	9.1	8.5	7.8	10.3	19.6	19.4	19.4	19.4	15.6	12.6	10.6
22	9.4	8.9	8.4	7.9	16.1	19.6	19.4	19.4	19.3	15.4	12.8	10.6
23	9.7	9.2	8.6	8.0	11.0	19.6	19.4	19.4	18.9	15.9	12.7	10.6
24	9.7	9.2	8.4	7.8	10.6	19.6	19.4	19.4	19.1	15.3	12.5	10.3
25	9.9	9.1	8.4	8.5	10.1	19.6	19.4	19.4	18.9	15.2	12.3	10.3
26	9.9	9.0	8.2	8.2	10.6	19.6	19.4	19.4	19.2	15.1	12.4	10.2
27	9.9	9.1	8.4	8.0	10.1	19.6	19.4	19.4	19.4	15.0	12.0	11.1
28	9.5	9.1	8.3	7.9	9.6	19.6	19.4	19.4	19.0	15.0	12.3	10.6
29	9.4	9.0	8.3	7.8	.....	19.6	19.4	19.4	18.8	14.9	12.3	10.5
30	9.5	8.9	8.2	7.8	.....	19.6	19.4	19.4	18.6	14.5	11.8	10.4
31	9.7	.....	8.1	7.8	.....	19.6	.....	19.4	.....	14.5	11.9	.....

Monthly discharge of Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	11.2	9.4	10.1	621
November	10.5	8.9	9.35	556
December	9.1	8.1	8.70	535
January	8.5	7.8	8.01	493
February	16.1	7.4	8.62	479
March	20.4	9.4	17.9	1,100
April	19.4	19.4	19.4	1,150
May	19.4	19.4	19.4	1,190
June	19.4	18.6	19.3	1,150
July	18.7	14.5	16.6	1,020
August	15.1	11.8	13.3	818
September	11.7	10.2	10.9	649
The year	20.4	7.4	13.5	9,760

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER NEAR AZUSA, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 1 N., R. 10 W., near road crossing at mouth of canyon, half a mile above Southern California Edison Co.'s power house and 2 miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—222 square miles.

RECORDS AVAILABLE.—1894 to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on left bank at rock point above ford. Original location of gage was just above ford at mouth of canyon. On account of frequent changes in channel it has been necessary to install numerous gages at points from 1,000 feet above ford to 600 feet below. Most of the various gages used from time to time have been installed at independent datums.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above ford or by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.45 feet at 1.30 p. m. March 7 (discharge, 8,680 second-feet); stream dry at gage October 1 to February 20 and June 12 to September 30.

1894–1918: Maximum stage recorded, 12.0 feet January 18, 1916 (discharge, 40,000 second-feet); stream dry for several months each year.

DIVERSIONS.—The power canal of the Southern California Edison Co. heads about 5 miles above the station. Water was diverted through the tunnel about 500 feet above ford April 3 to June 22. (For daily discharge of these canals see pp. ——.)

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except February 22 and March 7 and 10 when discharge for two-hour intervals was averaged, and March 12–22 when shifting-control method was used. Records fair.

Discharge measurements of San Gabriel River near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 22	F. C. Ebert	6.82	2730	Mar. 30	F. C. Ebert	5.38	356
23	do	5.10	487	Apr. 7	do	5.24	317
25	do	4.68	234	13	H. J. Tompkins	5.10	259
26	do	4.86	322	19	do	4.57	118
Mar. 4	do	4.11	50	26	do	4.48	119
7	C. W. Sopp	8.20	5,650	May 1	F. C. Ebert	4.20	77
8	do	6.52	1,930	7	C. W. Sopp	4.08	72
11	do	7.60	4,280	10	F. C. Ebert	3.86	53
15	H. J. Tompkins	6.90	1,180	17	C. W. Sopp	3.64	42
18	do	6.20	680	18	do	3.29	20
21	F. C. Ebert	5.89	626	24	do	2.73	3.0
23	do	5.75	542	June 5	F. C. Ebert	2.52	0.3

Daily discharge, in second-feet, of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	100	410	76	0.7	16	.....	1,050	164	42	.....
2	.....	64	388	72	.7	17	.....	850	142	36	.....
3	.....	52	367	70	.6	18	.....	720	132	20	.....
4	.....	44	348	69	.4	19	.....	790	124	18	.....
5	.....	42	328	75	.2	20	.....	690	124	15	.....
6	.....	184	310	75	1.1	21	200	630	115	13	.....
7	.....	4,120	310	66	1.4	22	1,580	500	115	11	.....
8	.....	2,030	292	58	1.1	23	400	530	115	4.2	.....
9	.....	870	292	55	1.1	24	184	505	114	2.4	.....
10	.....	1,810	292	53	.9	25	241	480	112	2.4	.....
11	.....	4,940	276	51	.4	26	292	455	112	2.1	.....
12	.....	4,100	259	49	.....	27	207	432	103	1.6	.....
13	.....	3,520	259	47	.....	28	148	410	99	2.8	.....
14	.....	1,950	229	44	.....	29	.....	388	89	4.9	.....
15	.....	1,250	175	43	.....	30	.....	348	78	3.7	.....
						31	.....	348	.....	1.0	.....

NOTE.—No flow Oct. 1 to Feb. 20 and June 12 to Sept. 30.

Monthly discharge of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	1,580	.0	116	6,440
March	4,940	42	1,100	67,600
April	410	78	209	12,400
May	76	1.0	34.9	2,150
June	1.4	.0	.29	17.2
The year	4,940	.0	123	88,600

NOTE.—See page 53 for Southern California Edison Co.'s canal near Azusa and page 54 for tunnel diversion near Azusa.

Daily discharge, in second-feet, of San Gabriel River and canals near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	32	32	35	190	410	203	129	83	52	42
2	24	24	32	32	34	154	388	197	128	81	52	41
3	23	24	32	32	34	142	382	195	126	76	49	39
4	23	24	34	32	33	134	368	194	122	78	46	40
5	22	26	34	32	32	132	348	177	119	74	48	39
6	22	37	33	31	32	274	330	194	117	73	48	35
7	22	40	33	31	34	4,210	332	185	111	72	50	37
8	22	36	32	31	33	2,120	317	177	107	71	49	36
9	22	34	32	32	32	960	317	174	107	70	47	36
10	22	33	32	31	32	1,900	332	175	105	69	48	35
11	22	32	32	30	32	5,030	321	173	104	70	47	34
12	24	32	32	31	31	4,190	319	171	102	69	47	34
13	27	32	33	33	31	3,610	299	175	102	68	46	34
14	28	32	33	33	32	2,040	311	172	98	68	48	38
15	29	32	33	33	32	1,340	275	175	98	65	50	39
16	31	32	32	33	32	1,140	261	174	98	65	53	41
17	32	32	32	33	32	940	239	175	97	62	51	40
18	31	32	32	33	61	810	257	159	96	61	49	37
19	27	29	32	32	46	880	249	140	95	60	47	37
20	28	29	32	32	64	780	256	140	94	58	47	38
21	27	29	32	32	290	720	228	138	93	57	46	35
22	26	30	32	32	1,670	590	234	139	92	57	44	38
23	25	31	32	32	490	620	234	136	88	57	42	38
24	24	32	33	32	274	595	233	138	89	57	42	38
25	24	32	33	38	331	570	231	140	88	58	40	37
26	23	32	33	38	382	545	231	141	87	58	39	36
27	24	32	33	36	297	522	222	141	84	55	41	56
28	26	32	33	35	238	500	226	139	82	53	40	55
29	27	32	32	35	.....	478	214	141	83	52	43	48
30	27	32	32	35	.....	438	203	137	81	51	41	43
31	26	.....	32	35	.....	438	.....	129	.....	50	41	.....

Monthly discharge of San Gabriel River and canals near Azusa, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	32	22	25.3	0.114	0.13	1,560
November	40	24	31.0	.140	.16	1,840
December	34	22	32.5	.146	.17	2,000
January	38	30	32.9	.148	.17	2,020
February	1,670	31	168	.757	.79	9,330
March	5,080	132	1,190	5.36	6.18	73,200
April	410	208	286	1.29	1.44	17,000
May	203	129	163	.734	.85	10,000
June	129	81	101	.455	.51	6,010
July	83	50	64.5	.291	.34	3,970
August	53	39	46.2	.208	.24	2,840
September	56	34	39.2	.177	.20	2,330
The year	5,080	22	183	.824	11.18	132,000

SOUTHERN CALIFORNIA EDISON CO.'S[1] CANAL NEAR AZUSA, CALIF.

LOCATION.—At Southern California Edison Co.'s power house, 5 miles southwest of intake on San Gabriel River and 1½ miles north of Azusa, Los Angeles County.

RECORDS AVAILABLE.—1896 to September 30, 1918.

DISCHARGE.—Computed from record showing kilowatt output of power plant on the assumption that 1 second-foot develops 25 kilowatts.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year 90 second-feet during February, March, April, May, and June. Canal dry April 1–13.

1896–1918: Maximum mean daily discharge recorded, 97 second-feet; November 27, 1906; canal usually dry for a few days each year.

ACCURACY.—Records good.

Diversion dam for canal is on San Gabriel River in SE. ¼ SE. ¼ sec. 31, T. 2 N., R. 9 W., 5 miles above gaging station on San Gabriel River at the mouth of the canyon near Azusa. The water is used for power development at a point about 1½ miles north of Azusa, and after leaving the power plant is divided and used for irrigation—part is discharged into Azusa-Covina canal and the remainder into Duarte canal. During the rainy season part of the water from the power plant is wasted back into San Gabriel River below the gaging station.

[1] Canal owned by Pacific Light & Power Corporation until 1917.

Daily discharge, in second feet, of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	32	32	35	90	.....	90	90	83	52	42
2	24	24	32	32	34	90	.....	90	90	81	52	41
3	23	24	32	32	34	90	.....	90	90	76	49	39
4	23	24	34	32	33	90	.....	90	90	78	46	40
5	22	26	34	32	32	90	.....	90	90	74	48	39
6	22	37	33	31	32	90	.....	90	90	73	48	35
7	22	40	33	31	34	90	.....	90	90	72	50	37
8	22	36	32	31	33	90	.....	90	90	71	49	36
9	22	34	32	32	32	90	.....	90	90	70	47	36
10	22	33	32	31	32	90	.....	90	90	69	48	35
11	22	32	32	30	32	90	.....	90	90	70	47	34
12	24	32	32	31	31	90	.....	90	90	69	47	34
13	27	32	33	33	31	90	.....	90	90	68	46	34
14	28	32	33	33	32	90	52	90	90	68	48	38
15	29	32	33	33	32	90	90	90	90	65	50	39
16	31	32	32	33	32	90	90	90	90	65	53	41
17	32	32	32	33	32	90	90	90	90	62	51	40
18	31	32	32	33	61	90	90	90	90	61	49	37
19	27	29	32	32	46	90	90	90	90	60	47	37
20	28	29	32	32	64	90	90	90	90	58	47	38
21	27	29	32	32	90	90	90	90	90	57	46	35
22	26	30	32	32	90	90	90	90	90	57	44	38
23	25	31	32	32	90	90	90	90	88	57	42	38
24	24	32	33	32	90	90	90	90	89	57	42	38
25	24	32	33	38	90	90	90	90	88	58	40	37
26	23	32	33	38	90	90	90	90	87	58	39	36
27	24	32	33	36	90	90	90	90	84	55	41	56
28	26	32	33	35	90	90	90	90	82	53	40	55
29	27	32	32	35	.....	90	90	90	83	52	43	48
30	27	32	32	35	.....	90	90	90	81	51	41	43
31	26	.....	32	35	.....	90	.....	90	.....	50	41	.....

NOTE.—No flow Apr. 1–13.

Monthly discharge of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	32	22	25.3	1,560
November	40	24	31.0	1,840
December	34	32	32.5	2,000
January	38	30	32.9	2,020
February	90	31	51.6	2,870
March	90	90	90.0	5,530
April	90	0	49.7	2,960
May	90	90	90.0	5,530
June	90	81	88.7	5,280
July	83	50	64.5	3,970
August	53	39	46.2	2,840
September	56	34	39.2	2,330
The year	90	0	53.5	38,700

TUNNEL DIVERSION NEAR AZUSA, CALIF.

LOCATION.—About on line between secs. 22 and 23, T. 1 N., R. 10 W., at weir box where water is divided between Azusa and Duarte canals, 1,000 feet northeast of Southern California Edison Co.'s power plant, and 1½ miles north of Azusa, Los Angeles County.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Gage heights are determined by measuring distance to water surface from reference point on north wall of weir box. Gage read by B. Bunje.

DISCHARGE MEASUREMENTS.—Made by wading near reference point.

CHANNEL AND CONTROL.—Concrete weir box.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The intake of this canal is on San Gabriel River about 600 feet above United States Geological Survey gaging station on San Gabriel River near Azusa. Water is used to augment the irrigation supply obtained from the tailrace of the Southern California Edison Co.'s power plant and to provide a supply when the water is shut out of power canal.

Discharge measurements of tunnel diversion near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 7	F. C. Ebert	1.36	22	May 18	Sopp and Tompkins	.98	48
13	H. J. Tompkins	.....	40	24	C. W. Sopp	.95	49
19	Sopp and Tompkins	1.29	25	June 5	Ebert and Sopp	1.28	28
May 1	F. C. Ebert	1.24	28	6	F. C. Ebert	1.37	22
10	.....do	1.15	34	15	.....do	1.69	8.6
17	C. W. Sopp	1.24	30	21	H. J. Tompkins	.....	4.8

Daily discharge, in second-feet, of tunnel diversion near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1	.....	37	38	11	45	32	14	21	23	35	3
2	.....	35	37	12	60	32	12	22	29	38	2
3	15	35	35	13	40	38	12	23	29	42	.....
4	20	35	32	14	29	38	8.5	24	29	46	.....
5	20	12	29	15	10	42	8.5	25	29	48	.....
6	20	29	26	16	7	42	8.5	26	29	49	.....
7	22	29	20	17	7	49	7	27	29	49	.....
8	25	29	16	18	35	49	6	28	37	46	.....
9	25	29	16	19	35	32	5	29	35	46	.....
10	40	32	14	20	42	35	4	30	35	43	.....
								31	.....	38	.....

NOTE.—No flow Oct. 1 to Apr. 2 and June 23 to Sept. 30. Discharge for Apr. 3–6 and 8–12 estimated by observer; June 17–22 interpolated.

Monthly discharge of tunnel diversion near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	60	0	26.7	1,590
May	49	12	37.8	2,320
June	38	0	11.8	702
The year	60	0	6.37	4,610

ROGERS CREEK NEAR AZUSA, CALIF.

LOCATION.—In the southwest corner of sec. 14, T. 1 N., R. 10 W., half a mile above mouth of creek and 2¼ miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—6.4 square miles (measured on topographic map).

RECORD AVAILABLE.—October 1, 1917, to September 30, 1918. (Discharge measurements only May 8, 1916, to June 11, 1917.)

GAGE.—Stevens water-stage recorder on left bank at mouth of canyon, one-half mile above junction with San Gabriel River.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 150 feet below gage.

CHANNEL AND CONTROL.—Boulders, gravel, and solid rock; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.25 feet at 11.30 p. m. March 10 (discharge, 332 second-feet); stream dry October 1 to November 10 and July 20 to September 30.

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage discharge relation not permanent throughout year. Rating curves well defined below 150 second-feet. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except March 7, 10, and 11, when hourly discharge was averaged. Records good.

Discharge measurements of Rogers Creek near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 27	E. Tompkins	0.72	0.09	Mar. 23	F. C. Ebert	1.80	12
Feb. 19	H. J. Tompkins	.88	.39	30	do	1.60	7.9
22	F. C. Ebert	2.63	43	Apr. 8	H. J. Tompkins	1.46	5.1
23	do	1.66	7.5	13	do	1.50	6.1
25	C. W. Sopp	1.71	8.4	19	C. W. Sopp	1.29	3.6
26	F. C. Ebert	1.70	7.9	26	H. J. Tompkins	1.28	3.2
Mar. 2	H. J. Tompkins	1.18	1.6	May 7	C. W. Sopp	1.18	2.5
4	F. C. Ebert	1.11	1.4	21	H. J. Tompkins	1.11	2.0
8	C. W. Sopp	2.37	27	June 6	do	1.00	.9
11	do	3.55	103	21	do	.82	.33
15	do	2.32	27	July 13	do	.72	.13
21	F. C. Ebert	1.90	15				

Daily discharge, in second-feet, of Rogers Creek near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	0.2	0.1	0.1	2.4	7.5	2.3	1.6	0.6
2	.....	.2	.1	.1	1.8	7.5	2.2	1.4	.4
3	.....	.1	.1	.1	1.6	7	2.1	1.2	.3
4	.....	.1	.1	.1	1.3	6.5	2.2	1.2	.3
5	.....	.1	.1	.1	1.5	6	2.3	1.2	.2
6	.....	.1	.05	.1	5	5.5	2.4	1.0	.2
7	.....	.1	.05	.2	96	5.5	2.3	1.0	.2
8	.....	.1	.1	.2	32	5	2.3	.9	.2
9	.....	.05	.1	.2	16	4.8	2.3	.8	.1
10	.....	.05	.1	.1	45	4.8	2.3	.8	.1
11	0.05	.05	.1	.1	144	4.6	2.1	.8	.1
12	.1	.05	.1	.1	89	4.6	2.0	.8	.1
13	.3	.05	.1	.1	65	5.5	1.8	.7	.1
14	.3	.05	.2	.1	41	4.8	1.7	.7	.2
15	.3	.05	.2	.1	28	4.3	1.8	.6	.2
16	.3	.05	.1	.1	22	4.1	1.8	.6	.2
17	.3	.05	.1	.2	19	3.8	1.9	.6	.1
18	.2	.05	.1	1.2	16	3.3	1.9	.5	.04
19	.2	.05	.1	.4	19	3.0	1.8	.6	.02
20	.2	.05	.1	.8	17	3.0	1.8	.6	.....
21	.1	.05	.1	6.4	15	3.0	1.8	.5	.....
22	.2	.05	.1	28	13	3.0	1.7	.4	.....
23	.2	.05	.1	8	12	3.0	1.6	.5	.....
24	.2	.1	.1	3.2	12	3.0	1.7	.6	.....
25	.2	.1	.2	9	11	3.1	1.7	.5	.....
26	.2	.1	.2	7.5	10	3.1	1.7	.5	.....
27	.2	.1	.1	5.5	10	3.0	1.7	.4	.....
28	.2	.1	.1	3.2	9	2.8	1.8	.4	.....
29	.2	.1	.1	.....	8.5	2.8	1.8	.4	.....
30	.2	.1	.1	.....	8	2.6	1.7	.5	.....
31	.....	.1	.1	.....	7.5	.....	1.6	.....	.....

NOTE.—No flow Oct. 1 to Nov. 10 and Aug. 20 to Sept. 30. No gage-height record Jan. 9–12, discharge interpolated.

Monthly discharge of Rogers Creek near Azusa, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 6.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
November	.3	.0	.138	0.022	0.02	8.21
December	.2	.05	.062	.013	.01	5.04
January	.2	.05	.110	.017	.02	6.76
February	28	.1	2.69	.420	.44	149
March	144	1.3	25.1	3.92	4.52	1,540
April	7.5	2.6	4.35	.680	.76	259
May	2.4	1.6	1.94	.303	.35	119
June	1.6	.4	.743	.116	.13	44.2
July	.6	.00	.118	.018	.02	7.26
The year	144	.00	2.96	.462	6.27	2,140

FISH CREEK NEAR DUARTE, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 15, T. 1 N., R. 10 W., three-fourths of a mile above mouth of canyon and 4 miles northeast of Duarte, Los Angeles County.

DRAINAGE AREA.—6.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 23 to September 30, 1916; July 28, 1917, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed July 28, 1917, at same location and datum as vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; appears permanent. Banks are high and not subject to overflow. A concrete control has been built at an outcrop of bedrock a short distance below gage.

EXTREMES OF DISCHARGE.—Maximum discharge during year, from water-stage recorder, 4.50 feet at 4 p. m. March 10 (discharge, 330 second-feet): minimum stage, 1.59 feet September 12 and 13 (discharge, 0.1 second-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year on account of repairs to control. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except that for March 7 and 10, for which it was determined by averaging the results obtained by applying to rating table gage height for two-hour intervals. Records good.

Discharge measurements of Fish Creek near Duarte, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Ernest Tompkins	1.74	0.35	Mar. 21	C. W. Sopp	2.48	15
Nov. 8	H. J. Tompkins	1.82	.65	29	F. C. Ebert	2.26	7.2
Dec. 19	Ernest Tompkins	1.78	.50	30	H. J. Tompkins	2.22	7.0
Jan. 18	Ebert and Sopp	1.82	.65	Apr. 4	C. W. Sopp	2.22	5.3
Feb. 7	H. J. Tompkins	1.86	.75	18	do	2.11	4.0
21	F. C. Ebert	2.71	21	May 3	do	2.03	2.3
23	do	2.37	8.4	21	do	2.00	1.9
25	H. J. Tompkins	2.48	14	June 7	do	1.92	1.4
Mar. 6	C. W. Sopp	2.28	6.9	21	H. J. Tompkins	1.82	.42
7	do	4.00	231	July 13	do	1.72	.16
20	F. C. Ebert	2.52	18	27	do	1.70	.15

Daily discharge, in second-feet, of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.2	0.2	0.6	0.4	0.6	4.1	6.5	2.4	1.7	0.6	0.1	0.1
2	.2	.1	.6	.4	.6	3.2	6.5	2.0	1.6	.6	.1	.1
3	.2	.1	.7	.4	.6	3.0	6.5	2.0	1.4	.3	.1	.1
4	.2	.1	.7	.4	.6	2.6	6.5	1.9	1.5	.3	.1	.1
5	.2	.2	.7	.4	.6	3.1	6	2.2	1.4	.2	.1	.1
6	.2	1.3	.6	.5	.6	7.5	6	2.4	1.3	.2	.1	.1
7	.2	.8	.6	.5	1.0	151	5.5	2.2	1.1	.2	.1	.1
8	.2	.6	.6	.5	.9	43	5.5	2.2	1.1	.2	.1	.1
9	.3	.6	.6	.6	.8	20	5	2.2	1.0	.2	.1	.1
10	.3	.6	.6	.7	.7	84	4.9	2.0	1.0	.2	.1	.1
11	.3	.5	.6	.7	.6	193	4.7	2.0	1.0	.1	.1	.1
12	.3	.5	.6	.6	.6	137	4.5	2.0	.8	.2	.1	.1
13	.3	.5	.5	.5	.6	98	4.3	2.0	.7	.3	.1	.1
14	.3	.5	.5	.6	.7	47	4.1	2.0	.7	.4	.1	.1
15	.3	.5	.5	.6	.7	34	3.8	2.0	.7	.4	.1	.1
16	.4	.5	.5	.6	.7	23	3.6	2.0	.7	.3	.2	.1
17	.4	.5	.5	.6	1.3	19	3.4	2.0	.6	.2	.2	.1
18	.4	.5	.5	.6	2.9	16	3.4	1.9	.5	.1	.2	.2
19	.2	.5	.5	.6	1.3	24	3.2	1.9	.5	.1	.2	.2
20	.2	.5	.5	.5	2.3	18	3.2	1.9	.6	.1	.1	.3
21	.1	.5	.5	.5	10	16	3.2	1.9	.7	.1	.1	.3
22	.1	.5	.5	.5	85	12	3.2	1.9	.5	.1	.1	.2
23	.1	.5	.5	.5	13	12	3.4	1.7	.5	.1	.1	.2
24	.1	.5	.5	.5	6.5	10	3.4	1.8	.6	.1	.1	.2
25	.1	.6	.5	.6	17	9.5	3.2	1.8	.7	.1	.1	.2
26	.1	.7	.5	.7	11	9	3.4	1.8	.7	.1	.1	.1
27	.2	.7	.4	.7	7	8.5	3.1	1.9	.5	.2	.1	.2
28	.2	.6	.4	.6	5.5	8	3.0	1.9	.5	.1	.1	.3
29	.3	.6	.4	.6	.....	7.5	2.8	1.9	.5	.1	.1	.2
30	.3	.6	.4	.6	.....	7	2.6	1.8	.5	.1	.1	.2
31	.3	.....	.4	.6	.....	6.5	.....	1.7	.....	.1	.1	.....

NOTE.—No gage-height record Oct. 4–14 and Dec. 9; discharge interpolated. Shifting-control method used Feb. 21.

Monthly discharge of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 6.5 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.1	0.23	0.035	0.04	14.1
November	1.3	.1	.51	.078	.09	30.3
December	.7	.4	.53	.082	.09	32.6
January	.7	.4	.55	.085	.10	33.8
February	85	.6	6.20	.954	.99	344
March	193	2.6	33.4	5.14	5.93	2,060
April	6.5	2.6	4.28	.658	.73	255
May	2.4	1.7	1.98	.305	.35	122
June	1.7	.5	.85	.131	.15	50.6
July	.6	.1	.21	.032	.04	12.9
August	.2	.1	.11	.017	.02	6.8
September	.3	.1	.15	.023	.03	8.9
The year	193	.1	4.10	.631	8.56	2,960

SAWPIT CREEK NEAR MONROVIA, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 13, T. 1 N., R. 11 W., at highway bridge just below junction of two main branches, 2 miles north of Monrovia, Los Angeles County.

DRAINAGE AREA.—5.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 8, 1916, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder, on left bank at east end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near gage.

CHANNEL AND CONTROL.—Bed consists of coarse gravel and boulders; apparently permanent. Channel is straight for 25 feet above gage and curved below; banks are high. A concrete boulder dam was built across channel just below gage for an artificial control. Lowest point in this control is at elevation of 0.70 foot on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.65 feet at midnight March 10–11 (discharge from extension of rating curve about 256 second-feet); stream dry October 1 to February 21 and April 20 to September 30.

1916–1918: Maximum stage recorded, 2.65 feet March 10, 1918 (discharge, 256 second-feet); stream dry April 7–16, 1917, April 21, 1917, to February 21, 1918; and April 20 to September 30, 1918.

DIVERSIONS.—Part of the water supply for Monrovia is obtained from the two branches of Sawpit Creek above gage. See record for Monrovia pipe line (p. —).

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year. A fairly well-defined rating curve, averaging all measurements obtained at this station, was used throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage heights determined by inspecting recorder graph, except for March 7, 10, and 11, when discharge for two-hour intervals was averaged. Records fair.

COOPERATION.—City of Monrovia furnished observer for water-stage recorder.

Discharge measurements of Sawpit Creek near Monrovia, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	F. C. Ebert	1.02	1.5	Mar. 20	F. C. Ebert	1.20	5.6
Mar. 11	E. Tompkins	1.74	54	29	do	1.05	1.6
15	C. W. Sopp	1.20	7.0	Apr. 4	C. W. Sopp	1.07	2.3

Daily discharge, in second-feet, of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1		1.4	3.2	11		88	.4	21		5	
2		1.4	3.4	12		34	.4	22	8.2	4.6	
3		1.4	3.2	13		21	1.8	23	2.5	3.7	
4		1.4	2.9	14		12	2.0	24	2.1	3.4	
5		1.4	2.5	15		9	1.8	25	2.9	3.4	
6		2.1	2.3	16		8.5	.8	26	1.5	3.2	
7		49	2.3	17		8.5	.05	27	1.4	3.0	
8		14	2.1	18		8	.03	28	1.6	2.9	
9		7	1.1	19		8	.04	29		2.5	
10		22	.4	20		6.5		30		2.7	
								31		2.9	

NOTE.—No flow Oct. 1 to Feb. 21 and Apr. 20 to Sept. 30.

Monthly discharge of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	8.2	0.00	.721	40.0
March	88	1.4	11.0	676
April	3.4	.00	1.02	60.7
The year	88	.00	1.08	777

Daily discharge, in second-feet, of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.7	1.3	1.2
2	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.6	1.3	1.2
3	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.6	1.3	1.2
4	1.4	1.5	1.6	1.5	1.6	2.9	4.9	2.7	2.1	1.5	1.3	1.2
5	1.4	1.5	1.6	1.5	1.6	2.9	4.5	2.6	2.1	1.5	1.3	1.2
6	1.4	1.9	1.6	1.5	1.6	4.0	4.4	2.6	2.0	1.5	1.3	1.2
7	1.4	1.7	1.6	1.5	1.6	51	4.7	2.6	2.0	1.5	1.3	1.2
8	1.4	1.7	1.6	1.5	1.6	15	4.5	2.6	1.9	1.5	1.3	1.2
9	1.4	1.6	1.6	1.5	1.6	8	3.9	2.6	1.9	1.5	1.3	1.2
10	1.4	1.6	1.6	1.5	1.6	23	3.7	2.6	1.9	1.4	1.3	1.2
11	1.4	1.5	1.6	1.5	1.6	89	3.7	2.6	2.1	1.4	1.3	1.2
12	1.4	1.6	1.6	1.5	1.6	35	3.7	2.4	2.1	1.4	1.3	1.2
13	1.5	1.6	1.6	1.5	1.6	22	4.4	2.4	1.9	1.4	1.3	1.2
14	1.6	1.6	1.6	1.5	1.5	13	4.1	2.4	1.9	1.4	1.3	1.5
15	1.6	1.6	1.6	1.5	1.5	11	3.9	2.4	1.8	1.4	1.4	1.4
16	1.7	1.6	1.6	1.5	1.5	12	3.4	2.7	1.8	1.4	1.4	1.4
17	1.7	1.6	1.6	1.5	1.5	12	3.0	2.6	1.8	1.4	1.4	1.4
18	1.5	1.6	1.6	1.5	1.9	11	3.0	2.5	1.7	1.4	1.4	1.3
19	1.5	1.6	1.6	1.5	1.6	11	2.8	2.4	1.7	1.4	1.4	1.3
20	1.5	1.6	1.6	1.5	1.8	8	2.8	2.4	1.7	1.4	1.4	1.3
21	1.5	1.6	1.6	1.5	1.9	6.5	2.8	2.4	1.7	1.4	1.4	1.3
22	1.5	1.6	1.6	1.5	10	6.5	2.8	2.4	1.7	1.4	1.3	1.3
23	1.5	1.6	1.5	1.5	4.0	6	2.8	2.4	1.7	1.4	1.3	1.3
24	1.5	1.6	1.5	1.5	3.4	6.5	3.3	2.4	1.7	1.4	1.3	1.3
25	1.5	1.6	1.5	1.5	5	6.5	3.1	2.1	1.7	1.4	1.3	1.3
26	1.5	1.6	1.5	1.5	3.7	6	3.1	2.1	1.7	1.4	1.2	1.3
27	1.5	1.6	1.5	1.5	3.0	5.5	3.1	2.1	1.7	1.4	1.2	1.5
28	1.5	1.6	1.5	1.5	3.2	5.5	2.8	2.1	1.6	1.4	1.2	1.4
29	1.5	1.6	1.5	1.5	.....	5.5	2.8	2.4	1.6	1.4	1.2	1.3
30	1.5	1.6	1.5	1.6	.....	5.5	2.8	2.1	1.6	1.4	1.2	1.3
31	1.5	.....	1.5	1.6	.....	5.5	.....	2.1	.....	1.4	1.2	.....

NOTE.—See page 62 for daily discharge of Monrovia pipe line.

Monthly discharge of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 5.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.7	1.4	1.48	0.279	0.32	91.0
November	1.9	1.5	1.60	.302	.34	95.2
December	1.6	1.5	1.57	.296	.34	96.5
January	1.6	1.5	1.51	.285	.33	92.8
February	10	1.5	2.37	.447	.47	132
March	89	2.9	13.1	2.47	2.85	805
April	5.5	2.8	3.71	.700	.78	221
May	2.7	2.1	2.45	.462	.53	151
June	2.1	1.6	1.85	.349	.39	110
July	1.7	1.4	1.44	.272	.31	88.5
August	1.4	1.2	1.30	.245	.28	79.9
September	1.5	1.2	1.28	.252	.27	76.2
The year	89	1.2	2.81	.530	7.21	2,040

MONROVIA PIPE LINE NEAR MONROVIA, CALIF.

LOCATION.—Near southeast corner of sec. 14, T. 1 N., R. 11 W., 300 feet above settling reservoir at mouth of Sawpit Canyon and 1½ miles north of Monrovia, Los Angeles County.

RECORDS AVAILABLE.—May 18, 1916, to September 30, 1918.

GAGE.—Vertical staff in weir box; read by E. S. Armstrong, canyon guard.

DISCHARGE.—Determined by two rectangular weirs with end contractions; left weir, 2.25 feet long; right weir, 2.26 feet long. Crest of left weir is at zero gage height; crest of right weir is 0.02 foot lower at one end. Rating table has been checked by current-meter measurements made at mouth of intake pipe in weir box.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.40 foot at 5 p. m. March 15 (discharge, 3.7 second-feet); minimum stage, 0.18 foot at 5 p. m. August 26 to September 13 (discharge, 1.1 second-feet).

1916–1918: Maximum stage recorded, 0.49 foot May 18–19, 1916 (discharge, 5.0 second-feet); minimum stage, 0.18 foot August 26 to September 13, 1918 (discharge, 1.1 second-feet).

ACCURACY.—Stage-discharge relation considered permanent since backwater conditions for any stage are probably constant. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by City of Monrovia.

The Monrovia pipe line furnishes part of the water supply of Monrovia. It obtains its water from two branches of Sawpit Creek. Most of this water is collected by tunnels driven into the sides of the canyon.

Daily discharge, in second-feet, of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.4	1.5	1.6	1.5	1.6	1.6	2.5	2.7	2.1	1.7	1.3	1.2
2	1.4	1.5	1.6	1.5	1.6	1.6	2.1	2.7	2.1	1.6	1.3	1.2
3	1.4	1.5	1.6	1.5	1.6	1.6	2.1	2.7	2.1	1.6	1.3	1.2
4	1.4	1.5	1.6	1.5	1.6	1.5	2.0	2.7	2.1	1.5	1.3	1.2
5	1.4	1.5	1.6	1.5	1.6	1.5	2.0	2.6	2.1	1.5	1.3	1.2
6	1.4	1.9	1.6	1.5	1.6	1.9	2.1	2.6	2.0	1.5	1.3	1.2
7	1.4	1.7	1.6	1.5	1.6	1.7	2.4	2.6	2.0	1.5	1.3	1.2
8	1.4	1.7	1.6	1.5	1.6	1.3	2.4	2.6	1.9	1.5	1.3	1.2
9	1.4	1.6	1.6	1.5	1.6	1.2	2.8	2.6	1.9	1.5	1.3	1.2
10	1.4	1.6	1.6	1.5	1.6	1.3	3.3	2.6	1.9	1.4	1.3	1.2
11	1.4	1.5	1.6	1.5	1.6	1.3	3.3	2.6	2.1	1.4	1.3	1.2
12	1.4	1.6	1.6	1.5	1.6	1.3	3.3	2.4	2.1	1.4	1.3	1.2
13	1.5	1.6	1.6	1.5	1.6	1.2	2.6	2.4	1.9	1.4	1.3	1.2
14	1.6	1.6	1.6	1.5	1.5	1.3	2.1	2.4	1.9	1.4	1.3	1.5
15	1.6	1.6	1.6	1.5	1.5	2.4	2.1	2.4	1.8	1.4	1.4	1.4
16	1.7	1.6	1.6	1.5	1.5	3.3	2.6	2.7	1.8	1.4	1.4	1.4
17	1.7	1.6	1.6	1.5	1.5	3.1	3.0	2.6	1.8	1.4	1.4	1.4
18	1.5	1.6	1.6	1.5	1.9	3.1	3.0	2.5	1.7	1.4	1.4	1.3
19	1.5	1.6	1.6	1.5	1.6	3.0	2.8	2.4	1.7	1.4	1.4	1.3
20	1.5	1.6	1.6	1.5	1.8	1.6	2.8	2.4	1.7	1.4	1.4	1.3
21	1.5	1.6	1.6	1.5	1.9	1.7	2.8	2.4	1.7	1.4	1.4	1.3
22	1.5	1.6	1.6	1.5	2.1	1.7	2.8	2.4	1.7	1.4	1.3	1.3
23	1.5	1.6	1.5	1.5	1.5	2.4	2.8	2.4	1.7	1.4	1.3	1.3
24	1.5	1.6	1.5	1.5	1.3	3.1	3.3	2.4	1.7	1.4	1.3	1.3
25	1.5	1.6	1.5	1.5	2.1	3.1	3.1	2.1	1.7	1.4	1.3	1.3
26	1.5	1.6	1.5	1.5	2.2	2.6	3.1	2.1	1.7	1.4	1.2	1.3
27	1.5	1.6	1.5	1.5	1.6	2.4	3.1	2.1	1.7	1.4	1.2	1.5
28	1.5	1.6	1.5	1.5	1.6	2.6	2.8	2.1	1.6	1.4	1.2	1.4
29	1.5	1.6	1.5	1.5	.....	2.8	2.8	2.4	1.6	1.4	1.2	1.3
30	1.5	1.6	1.5	1.6	.....	2.8	2.8	2.1	1.6	1.4	1.2	1.3
31	1.5	.....	1.5	1.6	.....	2.8	.....	2.1	.....	1.4	1.2	.....

Monthly discharge of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
October	1.7	1.4	1.48	91.0
November	1.9	1.5	1.60	95.2
December	1.6	1.5	1.57	96.5
January	1.6	1.5	1.51	92.8
February	2.2	1.3	1.66	92.2
March	3.3	1.2	2.09	129
April	3.3	2.0	2.69	160
May	2.7	2.1	2.45	151
June	2.1	1.6	1.85	110
July	1.7	1.4	1.44	88.5
August	1.4	1.2	1.30	79.9
September	1.5	1.2	1.28	76.2
The year	3.3	1.2	1.74	1,260

SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 10, T. 1 N., R. 11 W., at the head of what are known locally as "Hermits Falls," 4 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—10.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 31, 1916, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank of pool at head of Hermits Falls.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage or by wading at lower end of gage pool.

CHANNEL AND CONTROL.—Channel at gage is pool in bed rock; bed is rough and steep above and below pool. Banks high, clean, and not subject to overflow. Control is bedrock, the same for all stages, and is permanent. Zero flow, stage 0.47 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.75 feet at 12.30 a. m. March 11 (discharge, 248 second-feet); minimum stage from water-stage recorder, 0.74 foot September 11–12 (discharge, 0.3 second-foot).

1916–1918: Maximum stage recorded, 4.75 feet March 11, 1918 (discharge, 248 second-feet); minimum stage, 0.74 foot September 11–12, 1918 (discharge, 0.3 second-foot).

DIVERSIONS. None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table, except February 21–22 and March 7, 10, 11, when hourly discharge was averaged. Records good.

Discharge measurements of Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	H. J. Tompkins	0.86	0.90	Apr. 9	H. J. Tompkins	1.30	8.5
Jan. 15	Tompkins and Sopp	.89	.95	June 4	do	1.05	2.9
Feb. 26	C. W. Sopp	1.55	19	July 6	do	.91	1.3
Mar. 4	H. J. Tompkins	1.14	3.8	Aug. 2	do	.80	.44
27	do	1.50	15	Sept. 3	do	.77	.55

Daily discharge, in second-feet, of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.6	0.5	0.8	0.8	0.8	6.4	11	4.3	2.8	1.5	0.6	0.4
2	.6	.5	.8	.8	.8	5.0	11	4.0	2.6	1.4	.6	.4
3	.5	.4	.8	.8	.8	4.5	11	4.0	2.5	1.2	.4	.4
4	.5	.5	.8	.8	.8	4.0	10	4.3	2.6	1.1	.4	.4
5	.5	.6	.8	.8	.8	4.8	9.4	4.5	2.6	1.0	.6	.4
6	.5	1.3	.8	.8	1.0	13	9.1	4.5	2.5	1.0	.6	.4
7	.5	1.0	.8	.8	1.1	114	8.8	4.3	2.4	.9	.6	.4
8	.5	.9	.8	.8	.8	58	8.1	4.3	2.3	.9	.7	.4
9	.5	.8	.8	.8	.8	30	7.8	4.3	2.3	.8	.8	.4
10	.5	.8	.7	.7	.8	62	7.8	4.2	2.1	.8	.8	.4
11	.6	.8	.7	.8	.8	154	7.5	4.0	2.3	.8	.8	.3
12	.8	.9	.7	.8	.9	122	7.5	3.8	2.1	.9	.8	.3
13	.9	.9	.7	1.0	.9	93	8.4	3.5	2.1	1.1	.8	.4
14	1.0	.8	.7	1.0	.9	62	7.2	3.3	1.9	1.2	.8	.8
15	1.0	.8	.7	1.0	.9	47	7.0	3.5	1.9	1.1	.8	.8
16	1.0	.8	.7	1.0	.9	37	6.7	3.6	1.7	.9	.7	.8
17	1.0	.7	.7	.9	1.4	30	6.1	3.6	1.7	.8	.7	.8
18	.7	.7	.6	.9	3.0	26	5.6	3.6	1.8	.6	.7	.7
19	.6	.6	.6	.8	1.8	32	5.0	3.5	1.9	.6	.7	.7
20	.5	.7	.6	.8	3.5	29	5.0	3.3	1.6	.6	.7	.6
21	.5	.7	.6	.8	26	25	4.8	3.3	1.5	.7	.6	.5
22	.5	.7	.7	.8	82	23	5.0	3.2	1.5	.7	.6	.6
23	.5	.8	.8	.8	24	21	5.3	3.2	1.8	.7	.6	6
24	.5	.8	.8	.9	10	19	5.6	3.2	1.8	.8	.6	.6
25	.5	.8	.8	1.1	21	17	5.6	3.2	1.7	.8	.6	.5
26	.6	.8	.8	1.0	18	16	5.6	3.0	1.5	.8	.5	.5
27	.6	.8	.8	1.0	13	15	5.3	3.0	1.4	.8	.5	.9
28	.8	.8	.8	.9	8.4	14	5.3	3.2	1.4	.7	.5	.8
29	.8	.8	.8	.9	.....	13	5.3	3.3	1.4	.6	.5	.7
30	.6	.8	.8	.9	.....	11	4.8	3.0	1.4	.6	.5	.6
31	.6	.....	.8	.8	.....	11	.....	2.9	.....	.5	.5	.....

NOTE.—No gage height record Aug. 14 to Sept. 2; discharge interpolated.

Monthly discharge of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 10.5 square miles].

Month.	Discharge in second-feet.				Run-off	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage	Total in acre-feet.
October	1.0	0.5	0.64	0.061	0.07	39.4
November	1.3	.4	.76	.072	.08	45.2
December	.8	.6	.75	.071	.08	46.1
January	1.1	.7	.86	.082	.09	52.9
February	82	.8	8.07	.769	.80	448
March	154	4.0	36.1	3.44	3.97	2,220
April	11	4.8	7.09	.675	.75	422
May	4.5	2.9	3.64	.347	.40	224
June	2.8	1.4	1.97	.188	.21	117
July	1.5	.5	.87	.083	.10	53.7
August	.8	.4	.63	.060	.07	38.7
September	.9	.3	.55	.052	.06	32.5
The year	154	.3	5.16	.491	6.68	3,740

LITTLE SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—Near center of W. ½ sec. 9, T. 1 N., R. 11 W., 2 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—1.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 15, 1916, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on left bank about 150 feet below Scherer's cabin.

DISCHARGE MEASUREMENTS.—Made from wooden bridge near gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders; permanent. One channel at all stages; straight for 75 feet above control. Right bank is rock cliff; left bank is stone wall 5 feet high which is probably above maximum stage. Control is small concrete dam, with triangular notch at left end, just below gage. Zero flow, gage height, 0.70 foot, and top of dam, gage height, 1.50 feet.

EXTREMES OF DISCHARGE.—1916–1918: Maximum stage, from water-stage recorder, 2.30 feet at 12.30 a. m. March 10, 1918 (discharge, 58 second-feet); minimum stage, 0.86 foot at 7.30 p. m. September 12, 1918 (discharge, 0.03 second-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Water-stage recorder not in operation October 1–6, 18–20, and January 6–16. Mean daily gage heights determined by inspecting water-stage recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. October 1–6, 18–20, and January 6–16 discharge interpolated. Records good.

Discharge measurements of Little Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	H. J. Tompkins	1.02	0.10	May 4	H. J. Tompkins	1.30	0.58
Dec. 22	Ernest Tompkins	1.05	.15	16	do	1.30	.65
Feb. 21	C. W. Sopp	1.72	5.0	July 1	C. W. Sopp	1.12	.29
Mar. 11	H. J. Tompkins	1.97	18	Aug. 2	H. J. Tompkins	1.06	.19
28	C. W. Sopp	1.58	2.0	Sept. 23	do	1.02	.18
Apr. 22	H. J. Tompkins	1.34	.86				

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Daily discharge, in second-feet, of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.1	0.2	0.1	0.1	1.0	1.9	0.8	0.6	0.2	0.2	0.05
2	.1	.1	.2	.1	.1	.9	1.9	.7	.6	.2	.1	.05
3	.1	.1	.2	.1	.1	.8	1.7	.7	.6	.2	.1	.05
4	.1	.1	.2	.1	.1	.8	1.6	.7	.6	.2	.1	.1
5	.1	.1	.2	.1	.1	.9	1.5	.8	.5	.2	.1	.1
6	.1	.2	.2	.1	.1	1.4	1.4	.8	.5	.2	.1	.05
7	.1	.2	.2	.1	.2	12	1.3	.8	.5	.2	.1	.05
8	.1	.2	.2	.1	.2	7	1.2	.8	.5	.2	.1	.05
9	.1	.2	.2	.1	.2	3.5	1.2	.8	.5	.2	.1	.05
10	.1	.2	.2	.1	.1	6	1.2	.8	.6	.2	.2	.05
11	.1	.2	.2	.2	.1	23	1.2	.8	.6	.2	.1	.04
12	.1	.2	.2	.2	.1	18	1.2	.7	.6	.2	.1	.04
13	.2	.2	.2	.2	.2	12	1.3	.7	.5	.3	.2	.1
14	.2	.2	.2	.2	.2	8	1.1	.7	.5	.3	.2	.2
15	.2	.2	.2	.2	.2	6	1.1	.7	.5	.3	.2	.2
16	.2	.1	.2	.2	.2	5.5	1.1	.7	.4	.2	.2	.2
17	.2	.1	.2	.2	.2	4.1	1.1	.7	.3	.2	.2	.2
18	.2	.1	.2	.2	5	3.7	1.0	.7	.4	.2	.2	.1
19	.2	.1	.2	.2	5	3.9	.9	.7	.4	.2	.2	.1
20	.1	.1	.2	.2	.5	3.3	.9	.7	.3	.2	.1	.1
21	.1	.1	.2	.1	4.7	2.9	.9	.7	.3	.2	.1	.1
22	.1	.1	.2	.2	12	2.7	.9	.7	.3	.2	.1	.1
23	.1	.1	.2	.2	2.7	2.5	.9	.6	.3	.2	.1	.1
24	.1	.1	.2	.2	1.9	2.3	.9	.7	.3	.2	.1	.1
25	.1	.2	.2	.2	2.0	2.1	.9	.7	.3	.2	.1	.1
26	.1	.2	.2	.2	1.9	2.0	.9	.7	.3	.2	.1	.1
27	.1	.2	.2	.2	1.6	2.0	.9	.7	.3	.2	.1	.2
28	.1	.2	.2	.2	1.2	2.1	.8	.8	.3	.2	.1	.1
29	.1	.2	.2	.2	.....	2.1	.8	.7	.2	.2	.1	.1
30	.1	.2	.1	.2	.....	2.0	.8	.7	.3	.2	.05	.1
31	.1	.....	.1	.2	.....	1.9	.....	.6	.....	.2	.05	.....

NOTE.—No gage-height record Oct. 1–6, 8–20, and Jan. 6–16; discharge interpolated.

Monthly discharge of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.2	0.1	0.123	0.065	0.07	7.6
November	.2	.1	.153	.081	.09	9.1
December	.2	.1	.194	.102	.12	11.9
January	.2	.1	.165	.087	.10	10.1
February	12	.1	1.14	.600	.62	63.3
March	23	.8	4.72	2.48	2.86	290
April	1.9	.8	1.15	.605	.68	68.4
May	.8	.6	.723	.381	.44	44.5
June	.6	.2	.430	.226	.25	25.6
July	.3	.2	.210	.111	.13	12.9
August	.2	.05	.126	.066	.08	7.7
September	.2	.04	.099	.052	.06	5.9
The year	23	.04	.770	.405	5.50	557

SAN DIMAS CREEK NEAR SAN DIMAS, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 25, T. 1 N., R. 9 W., at mouth of San Dimas Canyon, 3 miles northeast of San Dimas, Los Angeles County.

DRAINAGE AREA.—18.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 3, 1916, to September 30, 1918. (Discharge measurements only April 14 to September 4, 1916.)

GAGE.—Gurley graph water-stage recorder on left bank, at mouth of canyon just above concrete control.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; shifting. Control is low concrete dam built across channel just below gage well. This dam was raised about 2 feet January 18–23, 1918. Gravel fills in above and below dam affecting stage-discharge relation. Left bank is steep and not subject to overflow; right bank is brushy and is overflowed during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.09 feet at 4 p. m. March 7 (discharge, 394 second-feet); minimum stage, 2.17 feet, September 7–10 (discharge, 0.1 second-foot).

1916–1918: Maximum stage recorded, 4.90 feet (original datum) December 24, 1916 (discharge, 770 second-feet); stream dry during a part of October and November, 1916.

DIVERSIONS.—None above. The San Dimas Water Co. diverts water for irrigation 150 feet below gage.

ACCURACY.—Stage-discharge relation not permanent throughout year, the changes being due to deposits of gravel above and below concrete control. Rating curves fairly well defined. Discharge March 12–18, April 5–17, and May 8 to June 27 computed by shifting-control method; daily discharge for remainder of year ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—San Dimas Water Co. furnished attendant for water-stage recorder.

Discharge measurements of San Dimas Creek near San Dimas, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	H. J. Tompkins	0.68	0.37	Mar. 22	F. C. Ebert	3.15	12
Dec. 7	do	.76	1.5	29	do	2.90	6.8
Jan. 21	C. W. Sopp		1.4	Apr. 4	C. W. Sopp	2.88	6.8
25	Ernest Tompkins	2.53	2.4	8	H. J. Tompkins	2.76	4.1
Feb. 18	C. W. Sopp	2.68	3.3	18	C. W. Sopp	2.71	4.0
21	F. C. Ebert	3.05	7.1	May 7	do	2.67	3.8
22	do	3.85	31	17	do	2.66	2.9
23	do	3.10	9.7	28	do	2.68	2.8
25	C. W. Sopp	2.95	6.9	June 28	do	2.30	.7
Mar. 7	do	4.90	302	July 19	do	2.20	.14
15	H. J. Tompkins	3.80	25	26	H. J. Tompkins	2.20	.19
18	C. W. Sopp	3.22	17	Sept. 4	Ellsworth and Ebert	2.18	*a* .1
20	F. C. Ebert	3.32	15				

a Estimated.

Daily discharge, in second-feet, of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.2	0.3	1.3	1.7	1.7	4.0	7	3.5	3.0	0.6	0.2	0.1
2	.2	.3	1.3	1.7	1.7	3.8	7	3.1	2.8	.6	.2	.1
3	.2	.3	1.4	1.7	1.7	3.4	6.5	2.9	2.7	.6	.2	.1
4	.2	.3	1.4	1.7	1.6	3.1	6.5	3.0	2.5	.6	.2	.1
5	.2	.4	1.4	1.7	1.5	3.4	5.5	3.4	2.3	.5	.2	.1
6	.2	.9	1.4	1.7	1.5	9.5	5	3.5	2.1	.5	.2	1
7	.2	.9	1.5	1.7	1.9	142	4.7	3.5	1.9	.5	.2	.1
8	.2	.8	1.4	1.7	1.8	54	4.4	3.8	1.8	.5	.2	.1
9	.2	.8	1.4	1.7	1.7	31	4.3	3.8	1.7	.4	.2	.1
10	.2	.8	1.5	1.7	1.7	37	4.4	3.6	1.7	.4	.2	.1
11	.3	.8	1.5	1.7	1.4	194	4.8	3.4	1.8	.4	.2	.1
12	.3	.7	1.5	1.7	1.4	80	4.9	3.2	1.7	.4	.2	.1
13	.3	.6	1.6	1.8	1.5	50	6	2.7	1.6	.3	.2	.1
14	.3	.6	1.7	1.8	1.5	31	5.5	2.6	1.5	.3	.2	.2
15	.4	.6	1.7	1.8	1.5	24	5	2.8	1.5	.3	.3	.2
16	.4	.6	1.7	1.8	1.5	25	4.8	2.9	1.5	.3	.3	.2
17	.4	.5	1.7	1.9	1.9	22	4.6	2.9	1.4	.2	.4	.2
18	.3	.6	1.6	1.8	3.5	18	4.1	2.7	1.3	.2	.3	.2
19	.3	.7	1.5	1.6	2.5	20	3.8	2.7	1.3	.2	.2	.1
20	.3	.8	1.5	1.5	2.6	18	3.8	2.8	1.2	.2	.2	.2
21	.3	.8	1.6	1.4	7	14	3.8	2.8	1.1	.2	.2	.3
22	.3	1.0	1.7	1.6	29	12	4.0	2.8	1.0	.2	.2	.3
23	.3	1.1	1.7	1.8	12	11	4.2	2.7	1.0	.2	.2	.3
24	.3	1.3	1.7	2.1	6	11	4.7	2.6	.9	.2	.2	.4
25	.3	1.3	1.7	2.4	8	9.5	5	2.6	.8	.2	.2	.4
26	.3	1.3	1.7	1.9	10	9	5.5	2.6	.8	.2	.2	.5
27	.3	1.3	1.7	1.8	7.5	8.5	5.5	2.6	.7	.2	.2	.5
28	.3	1.3	1.7	1.7	5.5	8	4.8	3.1	.7	.2	.1	.6
29	.3	1.3	1.7	1.6	.....	7.5	4.0	3.5	.7	.2	.1	.6
30	.3	1.2	1.7	1.6	.....	6.5	3.7	3.4	.7	.2	.1	.6
31	.3	.....	1.7	1.7	.....	6.5	.....	3.2	.....	.2	.1	.....

NOTE.—No gage-height record Oct. 1–10, 14–21, 28–31, Nov. 1, 2, 11, Jan. 18–25, May 9–10, 19–21, 30, 31, June 1–7, 16–31, July 1–18, Aug. 3, 4, 25–30, Sept. 15–17, and 29–30; discharge estimated.

Monthly discharge of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 18.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.2	0.28	0.015	0.02	17.2
November	1.3	.3	.81	.044	.05	48.2
December	1.7	1.3	1.57	.086	.10	96.5
January	2.4	1.4	1.74	.095	.11	107
February	29	1.4	4.32	.236	.25	240
March	142	3.1	25.4	1.39	1.60	1,560
April	7	3.7	4.93	.269	.30	293
May	3.8	2.6	3.05	.167	.19	188
June	3.0	.7	1.52	.083	.09	90.4
July	.6	.2	.33	.018	.02	20.3
August	.4	.1	.20	.011	.01	12.3
September	.6	.1	.24	.013	.01	14.3
The year	142	.1	3.71	.203	2.75	2,690

EATON CREEK NEAR PASADENA, CALIF.

LOCATION.—Near line between secs. 2 and 11, T. 1 N., R. 12 W., at mouth of canyon just above Mount Wilson toll bridge, 4 miles northeast of Pasadena, Los Angeles County.

DRAINAGE AREA.—6.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—March 1 to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on left bank just above toll bridge.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 3.47 feet at 4 a. m. March 11 (discharge, 168 second-feet); no flow May 13 to September 30.

DIVERSIONS.—The Precipice Canyon Water Co. diverts above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during period. Rating curve fairly well-defined throughout. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph except on March 7, when hourly discharges were averaged. Records good.

Discharge measurements of Eaton Creek near Pasadena, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 22	C. W. Sopp	1.98	41	Mar. 23	H. J. Tompkins	1.48	10
25	Ernest Tompkins	1.37	8.1	29	do	1.24	4.2
Mar. 1	C. W. Sopp	1.12	2.3	Apr. 5	do	1.20	3.1
4	Ebert and Sopp	.88	.55	12	do	1.10	2.3
11	Sopp and Tompkins	2.44	76	20	do	.96	.85
16	H. J. Tompkins	1.66	18	26	do	.98	1.2

Daily discharge, in second-feet, of Eaton Creek near Pasadena, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	2.3	3.6	0.25	11	105	2.3	.02	21	13	.7	.....
2	1.9	3.6	.1	12	77	1.9	.01	22	12	.7	.....
3	1.2	3.4	.15	13	63	2.4	.....	23	11	.8	.....
4	.6	3.4	.3	14	41	2.3	.....	24	8.5	.9	.....
5	.7	3.4	.35	15	28	1.8	.....	25	8	1.0	.....
6	4.6	3.3	.25	16	19	1.7	.....	26	7.5	1.0	.....
7	60	3.1	.15	17	17	1.4	.....	27	7	.9	.....
8	38	2.8	.05	18	14	1.1	.....	28	5	.7	.....
9	19	2.4	.05	19	19	1.5	.....	29	4.4	.5	.....
10	36	2.3	.04	20	15	.8	.....	30	4	.4	.....
								31	3.8	.....	.....

NOTE.—Gage-height record started Mar. 1. Discharge Feb. 22 and 24 is same as measurements made on those dates. No flow May 13 to Sept. 30.

Monthly discharge of Eaton Creek near Pasadena, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	105	0.6	20.9	1,290
April	3.6	.4	1.87	111
May	.35	.00	.055	3.38
The period	.....	.....	.....	1,400

Monthly discharge of Precipice Canyon Water Co.'s diversion near Pasadena, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet
	Maximum.	Minimum.	Mean.	
March			2.40	148
April			2.00	119
May			2.80	172
June			1.59	95
July			.82	50
August			.54	33
September			.51	30
The period				647

NOTE.—Compiled by engineers of U. S. Geological Survey from records submitted by W. I. Allen, manager of Precipice Water Co.

LOS ANGELES RIVER BASIN.

PACOIMA CREEK NEAR SAN FERNANDO, CALIF.

LOCATION.—In SE. ¼ NE. ¼ sec. 24, T. 3 N., R. 15 W., about 600 feet above mouth of canyon and 4 miles northeast of San Fernando, Los Angeles County.

DRAINAGE AREA.—27.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—March 31, 1916, to September 30, 1918 (not complete).

GAGE.—Gurley graph water-stage recorder on left bank installed December 2, 1916. Previous gage was a staff fastened to a boulder on left bank, 216 feet above water-stage recorder; it was at an independent datum and had a different control.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage well or by wading at gage.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; not permanent. Left bank is steep rock cliff; right bank is gentle slope covered with brush and trees. Control is a low boulder and concrete dam built across channel about 7 feet below gage well. Lowest point in control is at elevation of 1.1 feet on gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from water-stage recorder, 3.10 feet at 1 p. m. March 7 (discharge, 506 second-feet); stream practically dry October 1 to January 11 and June 26 to September 30.

1916–1918: Maximum stage recorded, 4.68 feet December 24, 1916 (discharge, 1,440 second-feet); stream dry July 11, 1917, to January 11, 1918, and June 26 to September 30, 1918.

DIVERSIONS.—None above station. There is a diversion just below control.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent on account of shifting of gravel above control. The four rating curves used during the year are fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph except March 20 to May 19 when, because of shifting control, it was interpolated between measurements. Records fair.

Discharge measurements of Pacoima Creek near San Fernando, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 28	H. J. Tompkins		0.00	Apr. 3	do	1.80	15
Nov. 17	do		.00	17	do	1.72	8.6
Dec. 30	do	1.23	.03	24	do	1.72	7.2
Feb. 21	Ernest Tompkins	1.70	6.3	May 2	C. W. Sopp	1.70	4.3
27	H. J. Tompkins	1.86	13	6	do	1.66	4.4
Mar. 7	do	3.10	506	20	do	1.65	3.3
8	do	2.31	99	June 5	H. J. Tompkins	1.60	1.7
13	do	2.64	183	22	C. W. Sopp	1.48	.12
20	C. W. Sopp	2.22	52	July 14	H. J. Tompkins		.00
26	H. J. Tompkins	1.84	28				

Daily discharge, in second-feet, of Pacoima Creek near San Fernando, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1		0.1	7.5	18	4.5	3.0	1.1
2		.1	6.5	17	4.3	2.7	.7
3		.1	6	15	4.3	2.4	
4		.1	6	14	4.4	1.7	
5		.1	6.5	14	4.4	1.5	
6		.1	11	13	4.4	1.4	
7		.4	191	13	4.2	1.2	
8		.1	88	12	4.1	1.1	
9		.1	44	12	4.0	.9	
10		.0	54	11	3.9	.7	
11		.0	230	11	3.8	.7	
12	0.1	.0	277	10	3.7	.6	
13	.1	.0	165	10	3.6	.4	
14	.1	.0	111	9.5	3.5	.3	
15	.1	.0	85	9	3.4	.1	
16	.1	.0	67	8.5	3.3	.1	
17	.1	.2	61	8.5	3.2	.1	
18	.1	1.5	54	8.5	3.1	.1	
19	.0	.6	56	8	3.0	.1	
20	.0	1.5	52	8	3.0	.1	
21	.0	5	46	7.5	3.0	.1	
22	.0	9.5	44	7.5	3.0	.1	
23	.0	5.5	42	7	3.0	.1	
24	.1	4.4	36	7	3.0	.3	
25	.1	10	32	6.5	3.0	.1	
26	.1	15	28	6.5	3.0	.0	
27	.1	13	25	6	3.0	.0	
28	.1	9.5	24	5.5	3.0	.0	
29	.1		22	5.5	3.0	.0	
30	.1		21	5	3.0	.0	
31	.1		19		3.0		

NOTE.—No flow Oct. 1 to Jan. 11 and July 3 to Sept. 30.

Monthly discharge of Pacoima Creek near San Fernando, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 27.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	0.1	0.0	0.05	0.0018	0.002	3.1
February	15	.0	2.75	.099	.10	153
March	277	6	61.9	2.22	2.56	3,810
April	18	5	9.80	.351	.39	583
May	4.5	3.0	3.52	.126	.15	216
June	3.0	.0	.66	.024	.03	29.4
July	1.1	.0	.06	.0022	.003	3.7
The year	277	.0	6.63	.238	3.23	4,800

TUJUNGA CREEK NEAR SUNLAND, CALIF.

LOCATION.—Approximately in center of sec. 32, T. 3 N., R. 13 W. (unsurveyed), at a partly constructed and abandoned dam, 2 miles above mouth of canyon and 4 miles northeast of Sunland, Los Angles County.

DRAINAGE.—106 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 28, 1916, to September 30, 1918. (Discharge measurements only, April 1 to August 27, 1916.)

GAGE.—Stevens water-stage recorder at right end of dam.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage or by wading at various sections near dam.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders. Control in concrete dam, which has a notch in center about 20 feet long and 1 foot deep, with a steel angle set in the notch near downstream face. Zero flow; gage heigth 0.45 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.25 feet at 2 a. m. March 11 (discharge, determined from extensions of rating curve, about 1,760 second-feet); minimum stage from water-stage recorder, 0.48 foot October 5–11 (discharge, 0.3 second-foot).

1916–1918: Maximum stage recorded, 3.35 feet December 24, 1916 (discharge, from revised rating curve defined by measurements in 1918, 1,960 second-feet); minimum stage, 0.47 foot August 29, 1917 (discharge, 0.2 second-foot).

DIVERSIONS.—Two or three ranches divert a part of the low-water flow for irrigation above the station. There are two small diversions between gage and mouth of canyon.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Frequent discharge measurements have been made and rating curve is well defined below 1,000 second-feet. Operation of water-stage recorder generally satisfactory. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. High-water records fair; other records good.

Discharge measurements of Tujunga Creek near Sunland, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	Ernest Tompkins	0.59	3.3	May 2	H. J. Tompkins	0.90	21
Jan. 22	C. W. Sopp	.60	4.2	15	do	.87	17
Feb. 16	H. J. Tompkins	.62	4.4	27	C. W. Sopp	.82	16
22	do	2.57	576	June 7	do	.72	9.6
Mar. 3	C. W. Sopp	1.12	38	22	do	.64	5.8
8	H. J. Tompkins	2.35	302	July 3	H. J. Tompkins	.60	3.3
26	C. W. Sopp	1.55	82	21	C. W. Sopp	.52	1.3
Apr. 6	H. J. Tompkins	1.23	50	Sept. 2	H. J. Tompkins	.49	.9
17	do	1.07	33				

Daily discharge, in second-feet, of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	1.9	4.4	3.6	4.9	47	56	24	12	6	0.5	0.4
2	.4	1.9	5.5	3.6	4.9	41	57	21	10	5.5	.5	.4
3	.4	2.2	6.0	4.0	4.9	37	55	20	12	4.0	.4	.4
4	.4	2.6	6.0	4.0	4.9	33	52	20	11	3.3	.4	.4
5	.3	3.0	5.5	4.4	4.4	34	32	20	10	3.0	.5	.4
6	.3	6.0	4.9	4.4	4.4	59	48	22	10	2.2	.5	.4
7	.3	6.5	3.6	4.4	6	550	47	23	9.5	1.9	.4	.4
8	.3	6.0	3.6	4.9	5.5	420	44	24	8.5	1.6	.5	.4
9	.3	5.5	4.0	5.5	4.9	148	42	24	8	1.6	.4	.4
10	.3	4.9	4.0	4.0	4.4	199	40	24	7.5	1.6	.4	.4
11	.3	4.9	4.0	4.4	4.4	1,050	38	19	8.5	1.6	.4	.4
12	.4	4.9	4.0	4.4	4.9	1,150	37	17	8	1.2	.4	.4
13	.5	4.4	4.0	5.5	4.9	1,100	38	18	7.5	1.6	.4	.4
14	.8	4.4	4.0	5.5	4.9	704	36	17	7	1.9	.4	.5
15	.8	4.0	4.4	5.5	4.9	340	34	17	7	1.9	.5	.5
16	.5	4.0	4.4	4.9	4.9	183	33	15	6.5	1.6	.4	.5
17	.5	3.6	4.4	5.5	7	147	32	19	6.5	.8	.4	.5
18	.4	3.3	4.4	4.9	16	131	30	19	6	.8	.4	.5
19	.3	2.6	4.4	4.0	12	159	27	19	7.5	.5	.4	.5
20	.4	2.2	4.4	4.0	20	140	27	19	8	.5	.5	.5
21	.4	2.6	3.6	4.0	104	128	26	19	6	1.2	.5	.5
22	.5	2.6	3.6	4.0	340	120	27	19	6	1.2	.5	.8
23	.5	2.6	3.6	4.4	123	107	27	19	6	1.2	.5	.8
24	.5	2.6	3.6	4.4	74	100	28	18	6	1.2	.5	.8
25	1.2	3.3	3.6	4.9	10.6	87	28	19	6	1.2	.5	1.2
26	1.2	3.6	3.6	5.5	133	80	29	21	5.5	.8	.5	1.2
27	1.6	3.6	3.6	4.9	85	74	29	17	4.4	.8	.5	2.2
28	2.2	3.6	3.3	4.4	62	70	27	19	4.0	.5	.5	3.6
29	1.9	3.3	3.0	4.9	.....	63	26	19	4.0	.5	.4	2.6
30	2.2	3.6	3.3	5.5	.....	59	24	16	4.0	.5	.4	2.2
31	2.2	.....	3.6	5.5	.....	58	.....	14	.....	.5	.4	.....

NOTE.—No gage-height record June 4–6 and 22; discharge estimated.

Monthly discharge of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2.2	0.3	0.74	0.0070	0.008	45.5
November	6.5	1.9	3.67	.035	.04	218
December	6	3.0	4.14	.039	.04	255
January	5.5	3.6	4.64	.044	.05	285
February	340	4.4	41.4	.391	.41	2,300
March	1,150	33	246	2.32	2.68	15,100
April	57	24	35.9	.339	.38	2,140
May	24	14	19.4	.183	.21	1,190
June	12	4.0	7.43	.070	.08	442
July	6	.5	1.70	.016	.02	105
August	.5	.4	.45	.0042	.005	27.7
September	3.6	.4	.82	.0077	.009	48.8
The year	1,150	.3	30.6	.289	3.93	22,200

HAINES CREEK NEAR TUJUNGA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 18, T. 2 N., R. 13 W., 800 feet above mouth of canyon and 1½ miles northeast of Tujunga, Los Angeles County.

DRAINAGE AREA.—1.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 7, 1917, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank, just above concrete control, 800 feet above mouth of canyon.

DISCHARGE MEASUREMENTS.—Made by volumetric method when discharge was very small, and on crest of dam. A bridge has been built 4 feet above dam for use during high water.

CHANNEL AND CONTROL.—Bed consists of boulders and gravel overlying solid rock; permanent; banks are high and fairly clean. A concrete dam, having a maximum height of about 5 feet above bed rock, was built across the channel at downstream face of gage well. A 12-foot concrete wing wall was constructed at left end of dam. Crest of dam has a trapezoidal notch 6 inches wide on bottom and 1 foot deep, which makes control more sensitive for low stages. Zero flow, gage-height 0.25 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 1.37 feet at 11 p. m. March 10 (discharge, 6.8 second-feet); minimum stage from water-stage recorder, 0.32 foot October 1–3 and August 25 to September 12 (discharge 0.03 second-foot).

1917–1918: Maximum stage recorded, 1.37 feet March 10, 1918 (discharge, 6.8 second-feet); minimum stage, 0.32 foot September 20–30 and October 1–3, 1917 and August 25 to September 12, 1918 (discharge, 0.03 second-foot).

DIVERSIONS.—About a mile above the station a tunnel has been driven into the stream bed and a 4-inch pipe carries the water past the gage. This water is used for domestic supply at Tujunga. A similar tunnel, a short distance below the station, obtains a small supply during the greater part of the year.

REGULATION.—A large number of small check dams, constructed of brush and boulders have been built across the stream channel in the upper part of the drainage basin.

ACCURACY.—Stage-discharge relations permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting gage-height graph, except February 21–22 and March 7 and 10 when discharge for two-hour intervals was averaged. Records good.

Discharge measurements of Haines Creek near Tujunga, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 15	H. J. Tompkins	0.36	0.06	Mar. 13	Ernest Tompkins	1.17	3.9
Feb. 22	Ernest Tompkins	.81	1.1	20	H. J. Tompkins	.88	1.7
Mar. 7	do	1.12	3.0	Apr. 10	C. W. Sopp	.65	.6
11	C. W. Sopp	1.09	3.4	Sept. 17	H. J. Tompkins	.34	.05

Daily discharge, in second-feet, of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.03	0.05	0.06	0.06	0.07	0.45	0.8	0.29	0.20	0.18	0.05	0.03
2	.03	.05	.06	.06	.09	.43	.8	.31	.18	.15	.04	.03
3	.03	.05	.07	.06	.09	.41	.75	.31	.17	.14	.04	.03
4	.04	.05	.07	.06	.07	.37	.7	.31	.17	.14	.04	.03
5	.04	.05	.07	.06	.07	.31	.7	.31	.17	.12	.04	.03
6	.04	.09	.07	.06	.07	.25	.7	.31	.17	.12	.04	.03
7	.04	.09	.07	.06	.07	1.3	.65	.31	.17	.11	.04	.03
8	.04	.07	.07	.06	.06	.7	.65	.31	.17	.11	.04	.03
9	.04	.07	.07	.06	.06	.65	.6	.31	.18	.11	.04	.03
10	.04	.07	.07	.06	.06	1.5	.6	.29	.23	.11	.04	.03
11	.04	.07	.07	.06	.06	3.2	.5	.27	.23	.11	.04	.03
12	.04	.07	.07	.06	.06	4.7	.5	.27	.22	.11	.04	.03
13	.04	.06	.07	.06	.06	4.2	.47	.25	.20	.11	.04	.04
14	.04	.06	.07	.06	.06	3.3	.45	.23	.20	.11	.04	.05
15	.04	.06	.06	.07	.06	2.6	.45	.23	.20	.11	.05	.04
16	.04	.06	.06	.07	.06	2.1	.45	.23	.20	.10	.06	.04
17	.05	.07	.06	.07	.10	1.8	.43	.23	.15	.10	.06	.04
18	.05	.07	.06	.07	.10	1.6	.43	.23	.17	.09	.06	.04
19	.05	.06	.06	.07	.10	2.0	.41	.23	.17	.06	.06	.04
20	.04	.06	.06	.07	.12	1.6	.39	.23	.15	.06	.06	.04
21	.04	.06	.06	.06	.31	1.4	.37	.23	.15	.06	.05	.04
22	.04	.07	.06	.06	1.4	1.4	.35	.23	.17	.06	.05	.04
23	.04	.07	.06	.06	.37	1.3	.35	.23	.15	.06	.04	.04
24	.04	.07	.06	.06	.45	1.2	.35	.23	.17	.06	.04	.04
25	.04	.07	.06	.06	.6	1.2	.35	.23	.17	.06	.03	.04
26	.04	.06	.06	.07	.55	1.1	.35	.23	.14	.06	.03	.04
27	.05	.06	.06	.07	.5	1.0	.33	.23	.14	.06	.03	.04
28	.04	.06	.06	.07	.47	.95	.31	.23	.15	.06	.03	.04
29	.04	.06	.06	.07	.....	.95	.31	.23	.15	.06	.03	.04
30	.05	.06	.06	.06	.....	.85	.29	.23	.15	.06	.03	.04
31	.05	.....	.06	.07	.....	.8	.....	.22	.....	.05	.03	.....

NOTE.—No gage-height record May 4–8; discharge interpolated.

Monthly discharge of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.05	0.03	0.041	2.52
November	.09	.05	.064	3.81
December	.07	.06	.064	3.94
January	.07	.06	.064	3.94
February	1.4	.06	.219	12.2
March	4.7	.25	1.47	90.4
April	.8	.29	.493	29.3
May	.31	.22	.257	15.8
June	.23	.14	.175	10.4
July	.18	.05	.094	5.78
August	.06	.03	.042	2.58
September	.05	.03	.036	2.14
The year	4.7	.03	0.253	183

ARROYO SECO NEAR PASADENA, CALIF.

LOCATION.—Near south line of sec. 30, T. 2 N., R. 12 W. (unsurveyed), just below trail crossing at forest ranger's station, in Angeles National Forest, 1½ miles above mouth of Millard Canyon, 3 miles above Devil's gate, and 5½ miles northwest of Pasadena, Los Angeles County.

DRAINAGE AREA.—16.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 1, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed September 30, 1916, on right bank just upstream from original staff gage. Original datum was not maintained.

DISCHARGE MEASUREMENTS.—Made from cable 115 feet below control or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock, gravel, and boulders. A concrete dam, extending to bedrock, was built across channel 15 feet below gage well. There is a notch in the crest 2 feet wide and 1 foot deep.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.10 feet at 11 p. m. March 10 (discharge, 1,030 second-feet); minimum stage from water-stage recorder, 0.77 foot at 5 p. m. October 7 (discharge, 0.07 second-foot).

1910–1918: Maximum stage recorded, 12.5 feet February 20, 1914 (discharge, from extension of rating curve, 5,630 second-feet); minimum stage recorded, 0.77 foot October 7, 1917 (discharge, 0.07 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout the year on account of shifting of gravel above control. The two rating curves used are well defined below 700 second-feet. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspection of recorder graph except March 7 and 10 when hourly discharge was averaged. Records good.

Discharge measurements of Arroyo Seco near Pasadena, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	Ernest Tompkins	0.94	0.33	Mar. 30	C. W. Sopp	2.00	14
Dec. 21	H. J. Tompkins	1.08	.85	Apr. 13	H. J. Tompkins	1.92	10
Jan. 22	C. W. Sopp	1.12	1.0	May 6	do	1.72	4.8
Feb. 21	do	2.50	71	10	C. W. Sopp	1.73	4.9
22	do	2.90	129	June 5	H. J. Tompkins	1.56	2.3
Mar. 7	Ernest Tompkins	3.64	578	21	C. W. Sopp	1.50	1.2
16	C. W. Sopp	2.40	46	July 22	H. J. Tompkins	1.35	.34
23	do	2.15	24				

Daily discharge, in second-feet, of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.2	0.9	0.9	1.1	9.5	13	4.9	2.9	1.4	0.2	0.2
2	.1	.2	.9	.9	1.1	8	14	4.4	2.6	1.3	.2	.2
3	.1	.2	.9	.9	1.1	7	13	4.2	2.5	1.2	.2	.2
4	.1	.4	.9	1.0	1.1	6	13	4.2	2.5	1.1	.2	.2
5	.1	.4	.9	.8	1.1	6.5	12	4.4	2.4	1.0	.2	.2
6	.1	.6	.9	.8	1.1	13	12	4.7	2.3	.9	.2	.2
7	.1	.5	.9	.8	1.5	246	12	4.7	2.2	.7	.2	.2
8	.1	.5	.9	.9	1.1	65	11	5.5	2.2	.6	.2	.2
9	.1	.4	.8	.9	1.0	32	11	5.5	1.9	.5	.2	.2
10	.1	.4	.8	.9	1.0	172	11	5	1.8	.4	.3	.2
11	.1	.5	.8	1.0	1.0	342	10	4.7	1.9	.4	.3	.2
12	.2	.5	.8	1.0	1.0	314	10	3.9	1.8	.5	.3	.2
13	.3	.5	.8	1.3	1.0	160	10	3.7	1.7	.6	.3	.2
14	.3	.5	.9	1.1	1.0	86	9	3.6	1.6	.6	.4	1.1
15	.4	.5	.8	1.1	1.0	59	8.5	3.4	1.5	.6	.5	.7
16	.4	.6	.9	1.1	1.0	46	8	3.6	1.4	.5	.5	.6
17	.4	.5	.9	1.1	1.7	38	7.5	3.7	1.4	.5	.5	.6
18	.3	.5	.9	1.1	3.4	32	7	3.7	1.3	.4	.4	.5
19	.3	.5	.9	1.0	2.4	44	6.5	3.7	1.5	.4	.4	.5
20	.2	.5	.9	1.1	3.9	40	6.5	3.6	1.5	.4	.4	.5
21	.2	.5	.9	1.1	45	33	6.5	3.6	1.5	.3	.4	.5
22	.2	.5	.9	1.1	107	28	7	3.6	1.4	.3	.3	.5
23	.2	.5	.9	1.1	32	24	7	3.4	1.4	.4	.3	.5
24	.2	.6	.9	1.0	17	20	7	3.4	1.3	.3	.3	.5
25	.2	.7	.9	1.1	27	19	7	3.4	1.3	.3	.2	.5
26	.2	.9	.9	1.1	32	18	7	3.4	1.2	.4	.2	.5
27	.3	.8	.9	1.1	19	17	7	3.2	1.1	.4	.2	.6
28	.3	.9	.9	1.1	17	16	7	3.9	1.1	.3	.2	.6
29	.3	1.0	1.0	1.1	.....	15	6.5	3.6	1.0	.3	.2	.4
30	.3	.9	1.0	1.1	.....	14	5.5	3.4	1.1	.2	.2	.4
31	.3	.....	1.0	1.1	.....	14	.....	3.1	.....	.2	.2	.....

NOTE.—No gage-height record Oct. 1–5, 18, 19, 26 and Sept. 24–27; discharge estimated.

Monthly discharge of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 16.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.1	0.213	0.013	0.01	13.1
November	1.0	.2	.540	.033	.04	32.1
December	1.0	.8	.890	.054	.06	54.7
January	1.3	.8	1.02	.062	.07	62.7
February	107	1.0	11.6	.707	.74	644
March	342	6	62.7	3.82	4.40	3,860
April	14	5.5	9.08	.554	.62	530
May	5.5	3.1	3.97	.242	.28	244
June	2.9	1.0	1.71	.104	.12	102
July	1.4	.2	.561	.034	.04	34.4
August	.5	.2	.284	.017	.02	17.5
September	1.1	.2	.403	.025	.03	24.0
The year	342	.1	7.77	.474	6.43	5,620

SANTA CLARA RIVER BASIN.

SESPE CREEK NEAR SESPE, CALIF.

LOCATION.—At Bradfield's camp, in Santa Barbara National Forest, three-fourths of a mile below mouth of West Fork of Sespe Creek, 4½ miles above intake of Fillmore canal, and about 6½ miles northwest of Sespe, Ventura County.

DRAINAGE AREA.—216 square miles (measured by Ralph Bennett, consulting engineer).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1918, when station was discontinued.

GAGE.—Painted on large boulder and on rock cliff on left bank; read by G. H. Killgore.

DISCHARGE MEASUREMENTS.—Make from cable 250 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.7 feet (only one reading and time not given) February 22 (discharge, 7,500 second-feet); minimum stage recorded, 4.33 feet October 4–6, record not complete (discharge, 3.6 second-feet).

1915–1918: Maximum stage recorded, 18.7 feet January 17, 1916 (discharge, 18,600 second-feet); minimum stage, 4.33 feet during September and October, 1917 (discharge, 3.6 second-feet).

ACCURACY.—Stage-discharge relation not permanent. Fairly well-defined rating curves used October 1 to February 22 and February 23 to March 7. Gage read to hundredths; number of readings a day not known. Daily discharge ascertained by applying reported gage height to rating table by interpolation (March 24 to April 5 and June 16 to August 3) or, by means of curves drawn through measurements covering short periods (March 8–23, April 6 to 15, and September 8–30). Records October 1 to March 7, good; other records fair.

COOPERATION.—Gage-height records and nearly all discharge measurements furnished by Sespe Light & Power Co.

Discharge measurements of Sespe Creek near Sespe, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	J. F. Waggoner	4.34	3.9	July 7	J. F. Russell	4.75	53
14	do	4.36	4.3	14	do	4.70	51
Feb. 2	J. F. Russell	4.44	9.4	21	do	4.65	48
10	do	4.47	8.4	28	do	4.65	45
15	do	4.48	7.5	Aug. 2	F. C. Ebert	4.60	17
Mar. 1	do	7.20	421	4	J. F. Russell	4.60	17
9	do	8.20	623	11	do	4.86	16
16	do	8.40	475	18	do	4.90	17
24	do	8.50	433	25	do	4.84	17
30	do	7.60	303	Sept. 1	do	4.83	17
Apr. 6	do	6.80	185	8	do	4.70	15
June 16	do	5.10	57	15	do	5.03	25
23	do	4.85	54	22	do	4.78	17
30	do	4.75	52				

Daily discharge, in second-feet, of Sespe Creek near Sespe, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.8	.....	6	440	269	111	74	52	23	17
2	3.8	.....	6	440	252	111	74	52	17	17
3	3.8	.....	6	405	235	104	71	52	17	17
4	3.6	.....	6	370	218	97	71	53	17	16
5	3.6	.....	6	405	201	100	68	53	17	16
6	3.6	.....	5.5	1,800	185	97	68	53	17	16
7	3.8	.....	6	6,350	195	94	66	53	17	15
8	3.8	.....	6	1,370	193	94	64	53	16	15
9	4.0	.....	6	623	192	97	64	53	16	15
10	4.0	.....	6.5	6,350	190	90	61	52	16	15
11	4.2	.....	6.5	1,940	191	83	61	52	16	15
12	4.2	.....	6	4,130	175	83	57	51	16	15
13	4.2	.....	6	1,700	165	77	57	51	16	29
14	4.2	.....	6	1,070	159	77	57	51	16	27
15	.....	.....	6.5	600	155	80	53	51	17	25
16	.....	.....	7	475	153	80	57	50	17	24
17	.....	.....	7	365	149	77	56	50	17	22
18	.....	.....	25	335	145	74	56	49	17	21
19	.....	.....	15	3,220	135	71	55	49	17	21
20	.....	.....	615	1,450	127	71	55	48	17	18
21	.....	.....	2,320	690	127	74	54	48	17	18
22	.....	.....	7,500	645	119	77	54	48	17	17
23	.....	.....	905	515	111	77	54	47	17	16
24	.....	.....	370	433	111	74	54	47	17	16
25	.....	6	1,800	410	104	71	53	46	17	16
26	.....	6	1,020	385	97	74	53	46	17	16
27	.....	5.5	628	360	97	74	53	45	17	35
28	.....	5.5	480	340	90	71	52	45	17	31
29	.....	5.5	.....	320	94	71	52	39	17	29
30	.....	6	.....	303	100	74	52	33	17	28
31	.....	6	.....	286	.....	71	.....	28	17	.....

NOTE.—No gage-height record Oct. 15 to Jan. 24.

Monthly discharge of Sespe Creek near Sespe, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October 1–14	4.2	3.6	3.90	0.018	0.01	108
January 25–31	6	5.5	5.79	.027	0.01	80.4
February	7,500	5.5	564	2.61	2.72	31,300
March	6,350	286	1,240	5.74	6.62	76,200
April	269	90	158	.731	.82	9,400
May	111	71	83.1	.385	.44	5,110
June	74	52	59.2	.274	.31	3,520
July	53	28	48.4	.224	.26	2,980
August	23	16	17.0	.079	.09	1,050
September	35	15	19.9	.092	.10	1,180

CARPINTERIA CREEK BASIN.

GOBERNADOR CREEK NEAR CARPINTERIA, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 14, T. 4 N., R. 25 W., 1,000 feet below junction of Eldorado and Steer creeks and 3½ miles northeast of Carpinteria, Santa Barbara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 24, 1916, to September 30, 1918 (not complete).

GAGE.—Vertical staff in two sections on left bank; read by K. C. Lillingston. A temporary gage was used June 24 to September 11, 1916; datum 1.11 feet lower.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts. Banks are high, clean, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from high-water mark, 3.0 feet February 22 (discharge, 138 second-feet); minimum stage recorded, 1.08 feet during October, November, December, August, and September (discharge, 1.1 second-feet).

1916–1918: Maximum stage recorded, 3.5 feet February 21, 1917 (discharge, 200 second-feet); minimum stage, 1.26 feet August 31, 1916 (discharge, 0.8 second-foot).

DIVERSIONS.—None above. The Gobernador Water Co. diverts water at its submerged dam 1 mile below station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed about February 22. Two rating curves were used: October 1 to February 22, well defined; February 23 to September 30, fairly well defined. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Records considered good.

COOPERATION.—Gage-height record furnished by K. C. Lillingston.

Discharge measurements of Gobernador Creek near Carpinteria, Calif., during the year ending Sept. 30, 1918.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 30	1.22	0.8	May 25	1.22	3.1
Apr. 11	1.30	6.5	Aug. 1	1.10	1.2

Daily discharge, in second-feet, of Gobernador Creek near Carpinteria, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				1.6	2.2							
2											1.2	
3					2.2					2.3	1.2	
4								5.5				
5		1.1		1.5	2.2					2.3		
6		1.8				22			3.1			
7			1.1									1.1
8			1.1	1.8	2.2				3.1			
9						15					1.6	
10										2.0		1.1
11	1.3				2.2			4.9				
12		1.5	1.1									
13	1.5						6		2.7	2.3	1.4	
14					2.2							
15	1.5			2.5				4.3	2.7			
16		1.5			2.2	15						1.2
17		1.5									1.8	
18								4.3	2.7	2.3		
19					2.2							
20						40				2.0		
21						29						1.2
22			1.5	2.2		26			2.7			
23					13	18					1.2	
24												
25					10	14		3.7		2.0		
26	1.1			2.5								
27					6	10						
28								3.1	2.3			2.0
29			1.5				5.5		2.3		1.1	
30	1.1	1.1		2.2								
31											1.2	

NOTE.—No gage-height record on days for which discharge is not given.

SANTA YNEZ RIVER BASIN.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CALIF.

LOCATION.—About on line between secs. 10 and 11, T. 5 N., R. 27 W., at Gibraltar dam site, just above mouth of Devil Canyon Creek and about 7 miles north of Santa Barbara, Santa Barbara County. Mono Creek enters 3¼ miles above station.

DRAINAGE AREA.—218 square miles at site used previous to August 2, 1916 (measured on topographic maps).

RECORDS AVAILABLE.—November 1, 1903, to April 30, 1907; October 1, 1907, to January 31, 1908; February 6, 1910, to November 24, 1918, when station was discontinued. Station was maintained about 4¼ miles above present site January 1 to June 20, 1903.

GAGE.—Friez water-stage recorder on left bank at portal of tunnel 50 feet above base of Gibraltar dam, August 2, 1916. Two temporary staff gages above the dam used from June 1 to November 24, when the water-stage recorder was removed. Previous gage was a staff in three sections about 900 feet below north portal of the Santa Barbara water-supply tunnel. April 13, 1911, gage datum was lowered 5.00 feet.

DISCHARGE MEASUREMENTS.—Made from cable at old gage or by wading at various sections.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifts greatly during extreme high water; relatively permanent at low water. Control, which is base of Gibraltar dam, is satisfactory except for periods when flash boards and sand bags are placed on crest. Controls for temporary gages shift considerably.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.45 feet at 9 p. m. March 10 (discharge, from extension of rating curve, about 9,090 second-feet); minimum stage unknown account of incomplete record.

1904–1918: Maximum stage recorded, 23.0 feet at 8 p. m. January 25, 1914 (discharge, 13,100 second-feet); no flow during most of July to September, 1904, and a part of September, 1916.

DIVERSIONS.—City of Santa Barbara diverts water at gage for municipal use. The record includes this diversion.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent February 19 to May 31. From January 19 to February 18 sand bags on dam were in use and changes were frequently made. The gage was removed May 1 and temporary gages installed 700 feet upstream. Rating curve used February 19 to May 31 well defined below 2,000 second-feet and is extended above. No rating curves were developed for the period when sand bags were on the dam or when temporary gages were used. Temporary gages read to hundredths twice daily. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table except January 19 to February 18 and June 1 to November 24, when the shifting-control method was used. Records good except those for high water, which are fair.

COOPERATION.—Gage-height records and most of discharge measurements furnished by City of Santa Barbara.

Discharge measurements of Santa Ynez River near Santa Barbara, Calif., during the period.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec-ft.*
Jan. 19	Elmer Gilchrest	1.98	1.0	July 1	F. S. Pinkham	2.62	13
26	do	2.32	2.7	3	do	2.48	11
29	do	2.16	1.4	5	do	2.47	10
Feb. 9	do	2.18	1.8	8	do	2.43	6.4
12	do	2.10	1.9	10	do	2.42	5.6
18	do	2.46	6.2	12	do	2.42	5.0
Mar. 11	Haskell and Browning	5.15	1,730	15	do	2.40	4.3
21	Haskell and Gilchrest	4.45	1,070	17	do	2.38	4.3
Apr. 3	F. S. Pinkham	3.27	271	19	do	2.38	4.0
5	do	3.16	222	22	P. Romero	2.35	3.9
10	F. C. Ebert	3.04	175	24	do	2.34	3.5
12	F. S. Pinkham	2.98	175	26	do	2.34	3.8
15	do	2.92	147	29	do	2.34	3.5
17	do	2.88	132	31	F. C. Ebert	2.32	2.9
19	do	2.85	124	31	P. Romero	2.33	3.5
22	do	2.80	110	Aug. 1	do	2.31	2.8
24	do	2.78	100	5	do	2.30	2.5
26	do	2.76	96	7	do	2.30	2.5
29	do	2.74	89	9	do	2.30	2.3
May 1	do	2.71	78	12	do	2.29	3.0
3	do	2.69	72	14	do	2.30	2.9
6	do	2.68	66	16	C. Codero	2.32	4.3
8	do	2.68	63	19	do	2.33	3.5
10	do	2.66	65	21	do	2.31	3.3
13	do	2.62	55	23	do	2.31	3.9
15	do	2.61	54	26	do	2.28	2.9
17	do	2.60	51	28	do	2.26	2.6
20	do	2.59	47	30	F. Carrillio	2.26	2.3
22	do	2.59	44	Sept. 2	do	2.26	2.8
24	F. C. Ebert	2.57	44	4	do	2.27	3.1
27	F. S. Pinkham	2.57	44	6	do	2.26	2.3
29	do	2.58	48	9	do	2.26	3.0
31	do	2.00	41	11	do	2.26	3.4
June 3	do	1.94	30	13	do	2.32	3.3
5	do	1.90	28	16	do	2.32	3.4
7	do	1.88	26	18	do	2.30	3.5
10	do	1.84	24	20	do	2.28	3.2
12	do	2.68	21	23	do	2.28	3.3
14	do	2.66	18	25	do	2.28	3.0
17	do	2.68	21	Oct. 1	F. S. Pinkham	2.42	6.7
19	do	2.64	20	3	do	2.40	6.0
21	do	2.64	18	Nov. 19	do	2.40	98
24	do	2.62	16	21	do	2.66	27
26	do	2.60	13	24		2.80	37
29	do	2.60	12				

Daily discharge, in second-feet, of Santa Ynez River near Santa Barbara, Calif., for the period Jan. 19 to Nov. 24, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov
1	.....	1.7	201	310	80	36	12	3.5	2.6	6.5	4.5
2	.....	1.7	190	295	74	33	11	3.0	2.8	6.0	4.5
3	.....	1.8	173	277	72	30	11	2.8	3.0	6.0	4.8
4	.....	1.6	166	257	72	29	11	2.5	3.1	47	5.0
5	.....	1.6	187	234	66	28	10	2.5	2.7	20	6.5
6	.....	1.9	455	223	72	27	9	2.5	2.3	13	7
7	.....	2.7	2,750	208	69	26	8	2.5	2.6	10	6.5
8	.....	2.3	1,300	194	72	25	6.5	2.4	2.8	9	6.5
9	.....	1.8	880	190	66	24	5.5	2.3	3.0	8.5	6.5
10	.....	1.6	1,900	184	66	24	5.5	2.5	3.2	8.5	7
11	.....	1.4	2,010	173	64	22	5.0	2.8	3.4	8	7
12	.....	1.5	2,010	166	61	21	5.0	3.0	3.2	7	6.5
13	.....	1.5	1,300	162	58	19	5.0	3.0	3.0	6.0	6.5
14	.....	1.5	720	156	53	18	4.3	2.9	3.2	5.5	15
15	.....	1.5	515	145	50	17	4.3	2.9	3.4	6.0	11
16	.....	1.5	455	135	53	16	4.3	4.3	3.4	6.0	9
17	.....	3.0	395	132	50	21	4.3	3.5	3.4	6.5	9
18	.....	7	720	129	50	20	4.0	3.5	3.5	6.0	160
19	1.0	7	4,280	122	50	20	4.0	3.5	3.4	6.0	98
20	.9	880	1,790	119	48	19	4.0	3.4	3.2	6.0	34
21	1.0	4,810	1,120	116	45	18	3.9	3.3	3.2	6.0	25
22	1.0	2,750	880	107	45	18	3.9	3.6	3.3	5.5	20
23	1.2	545	720	101	45	15	3.8	3.9	3.3	6.0	19
24	1.2	455	645	98	45	16	3.5	3.6	3.2	6.0	37
25	2.4	575	575	95	45	14	3.6	3.2	3.0	5.5	.....
26	3.0	425	515	95	45	13	3.8	2.9	3.0	5.0	.....
27	2.0	325	485	95	45	14	3.7	2.8	38	5.0	.....
28	1.7	257	425	95	45	13	3.6	2.6	20	5.0	.....
29	1.8	.....	395	92	50	12	3.5	2.4	13	4.8	.....
30	1.8	.....	335	86	45	12	2.2	2.3	8	4.8	.....
31	1.8	.....	325	.....	45	.....	2.9	2.4	.....	4.5	.....

NOTE.—No record Oct. 1 to Jan. 19.

Monthly discharge of Santa Ynez River near Santa Barbara, Calif., for the period Jan. 19 to Nov. 24, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 19–31	3.0	0.9	1.60	41.3
February	4,810	1.4	395	21,900
March	4,280	166	930	57,200
April	310	86	160	9,520
May	80	45	56.3	3,460
June	36	12	20.7	1,230
July	12	2.9	5.58	343
August	4.3	2.3	2.98	183
September	38	2.3	5.31	316
October	47	4.5	8.25	507
November 1–24	160	4.5	21.5	1,020
The period	.....	.....	.....	95,700

SANTA YNEZ RIVER NEAR LOMPOC, CALIF.

LOCATION.—Near east boundary of La Misión Vieja de la Purísima grant, at highway bridge 1½ miles east of Lompoc, Santa Barbara County.

DRAINAGE AREA.—725 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 10, 1906, to January 9, 1907; September 25, 1907, to September 30, 1918, when the station was discontinued. (Discharge not computed for 1909.)

GAGE.—Vertical staff fastened to downstream end of pier at right end of center span of bridge; read by McDonald and Daly. Datum lowered 1.00 foot June 27, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand; shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.1 feet at 7 p. m. February 20 (discharge, from extension of rating curve, about 15,700 second-feet); minimum stage, 1.56 feet October 8–12 (discharge, 18 second-feet).

1906–1918: Maximum stage recorded, 13.0 feet January 25, 1914 (discharge, 41,800 second-feet); on account of changes in channel minimum stage varies greatly from year to year; minimum discharge, 5 second-feet October 13 to 21, 1913.

DIVERSIONS.—Except for a small quantity diverted by the city of Santa Barbara at Gibraltar dam, water is not diverted above the station, but some water is pumped from wells along the banks of the river for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. One fairly well-defined rating curve was used February 20 to March 24. Gage read once a day; low-water readings to hundredths; remainder of readings to half-tenths. Daily discharge ascertained by applying gage height to rating table or by interpolation between discharge measurements. Records fair.

Discharge measurements of Santa Ynez River near Lompoc, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	Donald McDonald	1.56	18	June 23	Dennis Daly	0.88	88
Nov. 24	Dennis Daly	1.48	26	30	do	.88	67
Dec. 16	do	1.50	22	July 7	do	.94	87
Jan. 1	do	1.50	24	14	do	.88	69
10	F. C. Ebert	1.50	22	28	do	.76	42
Feb. 3	Dennis Daly	1.50	25	30	F. C. Ebert	.75	30
24	do	2.60	3,160	Aug. 4	Dennis Daly	.76	31
Mar. 24	do	1.80	1,650	11	do	.80	36
31	do	1.70	835	18	do	.88	33
Apr. 8	do	1.60	554	25	do	.88	39
14	do	1.60	383	Sept. 1	do	.88	31
15	do	1.60	392	8	do	.88	40
May 19	do	1.05	186	14	do	.90	47
21	F. C. Ebert	1.03	157	22	do	.90	41
June 3	Dennis Daly	1.09	129	29	do	.88	33
9	do	1.02	99	Nov. 20	do	1.11	160
16	do	.92	104				

Daily discharge, in second-feet, of Santa Ynez River at Lompoc, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	22	24	24	25	1,500	800	.....	135	74	30	31
2	18	22	24	24	25	1,200	765	.....	133	74	31	31
3	18	22	24	24	25	1,200	730	.....	131	74	31	31
4	18	22	24	24	25	1,200	695	.....	132	81	31	31
5	18	22	24	24	25	1,350	660	.....	132	87	31	31
6	18	24	24	22	25	1,420	625	.....	124	74	31	31
7	18	24	24	22	25	4,300	590	.....	124	87	31	31
8	18	24	24	22	25	4,020	554	.....	114	87	34	40
9	18	24	22	22	25	3,350	525	.....	99	74	34	41
10	18	24	22	22	25	2,830	497	.....	99	74	36	42
11	18	24	22	22	25	6,750	468	.....	100	81	36	44
12	18	24	22	22	25	4,500	440	.....	100	74	36	45
13	18	24	22	22	25	4,020	411	.....	102	69	35	46
14	18	24	22	22	25	2,830	383	.....	103	69	35	47
15	18	24	22	22	25	2,520	392	.....	104	68	34	47
16	20	26	22	23	70	2,150	386	.....	104	66	34	46
17	20	26	22	23	70	1,980	380	.....	104	64	33	45
18	20	26	22	23	100	1,980	374	.....	104	62	33	44
19	20	26	22	23	900	11,700	368	186	96	60	34	43
20	20	26	22	23	13,300	3,800	362	172	96	58	34	42
21	20	26	22	23	14,400	2,520	.....	157	96	56	35	41
22	20	26	22	24	6,230	2,240	.....	155	88	54	36	41
23	20	26	22	24	3,580	1,980	.....	153	88	52	37	33
24	20	26	24	24	2,830	1,650	.....	151	85	50	38	33
25	20	26	24	24	2,340	1,530	.....	149	81	48	39	33
26	22	26	24	24	2,150	1,420	.....	147	79	46	38	33
27	22	26	24	24	2,150	1,300	.....	145	76	44	37	33
28	22	26	24	25	1,800	1,180	.....	143	73	42	36	33
29	22	26	24	25	.....	1,070	.....	141	70	36	34	33
30	22	26	24	25	.....	950	.....	139	67	30	33	33
31	22	.....	24	25	.....	835	.....	137	.....	30	32	.....

NOTE.—No gage-height record Nov. 4–23; discharge interpolated; Apr. 21–30, discharge estimated as 330 second-feet; May 1–18, discharge estimated as 240 second-feet.

Monthly discharge of Santa Ynez River at Lompoc, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	22	18	19.4	1,190
November	26	22	24.7	1,470
December	24	22	23.0	1,410
January	25	22	23.3	1,430
February	14,400	25	1,800	100,000
March	11,700	835	2,620	161,000
April	800	.....	457	27,200
May	.....	137	203	12,500
June	135	67	101	6,010
July	87	30	62.7	3,860
August	39	30	34.2	2,100
September	47	31	37.8	2,250
The year	14,400	18	443	320,000

SALINAS RIVER BASIN.

ARROYO SECO NEAR SOLEDAD, CALIF.

LOCATION.—In sec. 21, T. 19 S., R. 6 E., at Pettitt's ranch, 15 miles south of Soledad, Monterey County.

DRAINAGE AREA.—215 square miles.

RECORDS AVAILABLE.—January 1, 1901, to September 30, 1918.

GAGE.—Staff in two sections on right bank; lower section fastened to an alder tree 400 feet above cable, upper section fastened to sycamore about 100 feet downstream. The lower section was washed out February 5, 1915. It was replaced in two sections at same location and datum as previous section. Gage read by Mrs. Charles Pettitt.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.4 feet at 8 a. m. March 12 (discharge, 6,200 second-feet); minimum stage recorded, 1.9 feet September 8–11 (discharge, 0.4 second-foot).

1901–1918: Maximum stage recorded, 16.5 feet at 4.30 p. m. February 21, 1917 (discharge, from extension of rating curve, about 22,000 second-feet); stage 20.5 feet January 25, 1914, gave discharge, 17,500 second-feet. Stream dry during periods in 1902, 1903, 1904, 1906, 1913, and 1914.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low water changed during flood of March 12. Rating curves for year fairly well defined below 10,000 second-feet. Gage read to hundredths once a day; more frequently during floods. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Arroyo Seco near Soledad, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Pettitt.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 17	2.46	36
24	5.43	1,100
July 26	2.00	1.6

Daily discharge, in second-feet, of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	9	17	27	25	209	164	69	38	1.6	1.1	.6
2	6.5	9	20	27	25	209	159	66	36	1.6	1.1	.6
3	6.5	9	20	27	25	202	155	66	33	1.6	1.1	.6
4	7	10	20	27	25	190	146	66	31	1.6	1.1	.6
5	7	10	20	27	25	168	142	66	31	1.6	1.1	.6
6	7	11	20	27	25	146	137	63	29	1.6	1.1	.6
7	7	11	20	25	70	1,300	133	63	29	1.6	1.1	.6
8	7	11	20	25	62	535	133	63	27	1.6	.9	.4
9	7	11	20	25	43	380	128	63	25	1.6	.9	.4
10	7	18	20	25	40	290	128	63	25	1.6	.9	.4
11	8	24	20	25	31	785	124	63	24	1.6	.9	.4
12	8	22	20	25	29	6,200	124	63	24	2.5	.9	31
13	8	20	22	27	27	4,080	120	60	22	2.5	.9	111
14	9	18	22	33	27	1,640	124	60	22	2.5	.9	100
15	9	17	22	31	25	580	124	57	20	2.5	.9	51
16	9	17	24	31	25	470	120	57	20	2.5	.9	31
17	10	15	24	31	33	348	116	54	18	2.5	.9	29
18	10	15	24	31	107	318	111	54	18	2.5	.9	29
19	10	14	24	31	75	895	103	54	18	2.5	.9	29
20	10	14	24	29	172	490	100	51	17	2.5	.9	29
21	9	14	24	29	785	380	91	51	17	1.6	.6	29
22	9	14	24	27	1,420	364	87	51	15	1.6	.6	27
23	9	14	24	27	1,240	348	84	51	15	1.6	.6	27
24	8	14	24	27	1,300	333	81	51	14	1.6	.6	27
25	8	15	24	27	580	318	78	48	14	1.6	.6	27
26	8	15	24	25	380	238	75	46	1.6	1.6	.6	27
27	8	15	40	25	209	228	75	46	1.6	1.6	.6	25
28	9	15	33	25	209	214	75	43	1.6	1.6	.6	25
29	9	17	29	25	.....	190	72	43	1.6	1.4	.6	25
30	9	17	29	25	.....	177	69	40	1.6	1.4	.6	25
31	9	.....	27	25	.....	168	.....	38	.....	1.4	.6	.....

Monthly discharge of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	10	6.5	8.21	0.038	0.04	505
November	24	9	14.5	.067	.07	863
December	40	17	23.4	.109	.13	1,440
January	33	25	27.2	.127	.15	1,670
February	1,420	25	251	1.17	1.22	13,900
March	6,200	146	722	3.36	3.87	44,400
April	164	69	113	.526	.59	6,720
May	69	38	55.8	.260	.30	3,430
June	38	1.6	19.7	.092	.10	1,170
July	2.5	1.4	1.84	.0086	.01	113
August	1.1	.6	.84	.0039	.004	51.6
September	111	.4	23.7	.110	.12	1,410
The year	6,200	.4	105	.488	6.60	75,700

COYOTE RIVER BASIN.

COYOTE RIVER NEAR MADRONE, CALIF.

LOCATION.—In northwest corner of San José grant, above highway bridge at mouth of canyon, one-fourth mile below mouth of Las Animas Creek and 2¾ miles northeast of Madrone, Santa Clara County.

DRAINAGE AREA.—193 square miles (reported by Duryea, Haehl, and Gilman).

RECORDS AVAILABLE.—October, 1902, to September 30, 1912; December 8, 1916, to September 30, 1918.

GAGE.—Inclined staff in three sections on left bank about 1,000 feet above highway bridge. Gage for 1902–1912 was on right bank at highway bridge. Read by Mrs. A. Rosa.

DISCHARGE MEASUREMENTS.—Made from highway bridge below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel, boulders, and solid rock. Banks high; one channel at all stages. Control boulders and solid rock; permanent. Zero flow, gage height 1.6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at 4 p. m. March 12 (discharge, 2,090 second-feet); minimum stage unknown; incomplete record.

1902–1912 and 1917–1918: Maximum discharge recorded, probably March 7, 1911 (discharge, 25,000 second-feet); minimum discharge not known, as record is incomplete.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined throughout. Gage read once daily, usually to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Coyote River near Madrone, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	J. F. Kunesh	2.06	1.0	May 2	H. D. McGlashan	2.51	5.9
Dec. 5	Charles Leidl	2.09	1.6	23	do	2.37	4.0
5	do	2.09	1.6	June 27	do	2.08	1.1
Mar. 13	do	5.90	481				

Daily discharge, in second-feet, of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.4	0.4	0.8	0.8	1.6	21	21	5	2.5	1.2	.....
2	.4	.4	.8	.8	1.6	18	18	6	2.5	1.2	.....
3	.4	.4	.8	.8	1.6	14	18	3.7	2.5	.8	.....
4	.4	.8	.8	.8	1.6	14	14	3.7	2.5	.8	.....
5	.4	.8	1.6	.8	1.6	11	14	3.7	2.5	.8	0.1
6	.4	.8	1.6	.8	2.5	14	14	3.7	2.5	.8	.....
7	.4	.8	1.6	.8	3.7	21	14	3.7	2.5	.8	.....
8	.4	.8	1.6	.8	2.5	62	14	5	2.5	.8	.....
9	.4	.8	.8	1.6	2.5	54	14	5	2.5	.4	.....
10	.4	.8	.8	1.6	2.5	70	11	3.7	2.5	.6	.....
11	.8	.4	1.6	2.5	2.5	62	11	3.7	2.5	.6	.....
12	.8	.4	1.6	2.5	2.5	2,090	11	3.7	2.5	.4	.....
13	.8	.8	1.6	2.5	2.5	530	11	3.7	2.5	.4	.....
14	.4	.8	1.6	2.5	2.5	238	11	3.7	1.6	.2	.....
15	.4	.8	1.6	2.5	2.5	149	11	3.7	1.6	.2	.....
16	.4	.8	1.6	2.5	5	90	9	3.7	1.6	.2	.....
17	.4	1.0	1.6	2.5	5	36	9	3.7	1.6	.1	.....
18	.4	.8	1.6	2.5	3.7	36	9	3.7	1.6	.1	.....
19	.4	.8	1.6	2.5	3.7	770	7	2.5	1.6	.1	.....
20	.4	.8	1.6	2.5	3.7	238	7	2.5	1.6	.1	.....
21	.2	.8	1.6	2.5	7	217	7	2.5	1.6	.....	.....
22	.2	.8	1.6	2.5	48	123	7	2.5	1.6	.....	.....
23	.2	.8	1.6	2.5	36	80	5	3.5	1.4	.....	.....
24	.2	.8	1.6	2.5	41	41	5	2.5	1.4	.....	.....
25	.2	.8	1.6	2.5	41	41	5	2.5	1.2	.....	.....
26	.2	.8	1.6	2.5	36	36	5	3.1	1.2	.....	.....
27	.2	.8	1.6	2.5	36	30	3.7	3.1	1.3	.....	.....
28	.4	.8	1.6	2.5	26	26	3.7	2.5	1.2	.....	.....
29	.4	.8	1.6	2.5	.....	21	3.7	2.5	1.2	.....	.....
30	.4	.8	1.6	1.6	.....	21	5	2.5	1.2	.....	.....
31	.4	.....	1.6	1.6	.....	21	.....	2.5	.....	.....	.....

NOTE.—No gage-height record July 21 to Sept. 30; discharge July 21–31 estimated as 0.1 second-foot. No estimates for August or September, on account of storms Sept. 11–12 and 29–30.

Monthly discharge of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.8	0.2	0.39	24.0
November	1.0	.4	.74	44.0
December	1.6	.8	1.45	89.2
January	2.5	.8	1.95	120
February	48	1.6	11.7	650
March	2,090	11	168	10,300
April	21	3.7	9.94	591
May	6	2.5	3.47	213
June	2.5	1.2	1.90	113
July	1.2	.0	.38	23.4
August	.....	.....	.1	6.1
The period	.....	.....	.....	12,200

COYOTE RIVER AT COYOTE, CALIF.

LOCATION.—Near north end of La Laguna Seca grant, one-fourth mile above ford and just east of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections, fastened to sycamore trees on left bank, 1,000 feet east of post office at Coyote; read by Nancy Boland.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting during high water. Channel clean and straight for several hundred feet above and below gage. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet at 5 p. m. March 12 (discharge, 1,470 second-feet); stream dry October 1 to March 11 and March 25 to September 30.

1917–1918: Maximum stage recorded, 15.2 feet at 5.30 p. m. February 2, 1917 (discharge, 9,900 second-feet); no flow most of each year.

DIVERSIONS.—None. Some water is pumped from wells along the river above Coyote.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed in 1918. Rating curve well defined. Gage read to tenths twice daily; more frequently during high water. Daily discharge ascertained by applying mean daily gage heights to rating table; except March 12, 13, 19, and 24, for which it was computed from plotted hydrographs. Records good.

Discharge measurements of Coyote Creek at Coyote, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 13	8.28	408	Mar. 20	8.02	305
19	8.75	572	23	6.60	12

Daily discharge, in second-feet, of Coyote River at Coyote, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Day.	Mar.	Day.	Mar.
12	809	16	3.0	22	36
13	468	19	288	23	8
14	100	20	257	24	1.2
15	25	21	90		

NOTE—No flow Oct. 1 to Mar. 11, Mar. 17–18, and Mar. 25 to Sept. 30. Mean discharge for March, 67.3 second feet; mean for year, 5.71 second-feet; total discharge for year, 4,140 acre-feet.

COYOTE RIVER NEAR EDENVALE, CALIF.

LOCATION.—At east boundary of Santa Teresa grant at "The Narrows," 1½ miles northeast of Edenvale, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Inclined staff in two sections fastened to solid rock on left bank at "The Narrows"; read by Mrs. J. H. Swickard.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Fine gravel overlying solid rock; not permanent. Channel is clean and straight for several hundred feet above and below gage. Left bank, high; right bank not likely to be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.6 feet at 5 p. m. March 12 (discharge, 915 second-feet); stream dry October 1 to March 11, March 17, 18, and March 24 to September 30.

1917–1918: Maximum stage recorded, 12.2 feet at 6.10 p. m. February 21, 1917 (discharge, 8,590 second-feet); no flow during most of each year.

DIVERSIONS.—None. Water is pumped from wells along the river above station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths twice daily; more frequently during high water. Daily discharge ascertained by applying mean daily gage heights to rating table, except March 12, 16, 19, and 24, for which it was computed from plotted hydrographs. Records good.

Discharge measurements of Coyote River near Edenvale Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 13	4.55	335
20	4.32	248
23	2.98	0.2

Daily discharge, in second-feet, of Coyote River near Edenvale, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Day.	Mar.	Day.	Mar.
12	363	16	1	22	12
13	405	19	159	23	1.3
14	74	20	240		
15	6.5	21	60		

NOTE.—No flow Oct. 1 to Mar. 11, Mar. 17, 18, and Mar. 24 to Sept. 30. Mean discharge for March, 42.6 second-feet; mean for year, 3.62 second-feet; total discharge for year, 2,620 second-feet.

LAGUNA SECA NEAR COYOTE, CALIF.

LOCATION.—In La Laguna Seca grant, at highway bridge on Bailey Avenue, 1¼ miles south of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to June 30, 1918, when station was discontinued.

GAGE.—Vertical staff in two sections fastened to downstream side of bridge near right bank. Gage read by E. W. Pruett.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 100 feet below gage.

CHANNEL AND CONTROL.—Drainage canal in clay and hardpan. Banks clean and high. Channel straight below bridge for one-fourth mile and curving above bridge. Control affected by growth of weeds.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.48 feet April 12 and 14 (discharge, 1.3 second-feet); no flow after June 27.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 17 when a small dam was built across the creek below the gage. Rating curve before change well defined; after change not defined. Gage read to hundredths about every other day. Daily discharge ascertained by applying gage height to rating curve and interpolating discharge for days on which gage height was not read, except June 17 to 27, when discharge was interpolated. Records good.

Discharge measurements of Laguna Seca near Coyote, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 6	Charles Leidl	0.41	0.4	Mar. 23	Charles Leidl	0.86	0.5
Jan. 17	do	.29	.02	May 2	McGlashan and Bailey	1.38	1.2
Mar. 13	do	.52	.15	23	H. D. McGlashan	1.27	.9
19	do	.73	.3	June 27	do	.93	.0

Daily discharge, in second-feet, of Laguna Seca near Coyote, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.07	0.07	1.0	1.2	0.9	16	.....	0.07	0.14	1.3	1.1	0.3
2	.....	.07	.07	1.1	1.2	.8	17	0.01	.08	.14	1.3	1.0	.3
3	.....	.07	.07	1.2	1.2	.8	18	.02	.07	.2	1.3	1.0	.3
4	.....	.07	.07	1.2	1.2	.8	19	.02	.09	.3	1.2	1.0	.2
5	.....	.07	.07	1.2	1.2	.8	20	.03	.08	.3	1.2	1.0	.2
6	.....	.08	.08	1.3	1.1	.8	21	.03	.08	.3	1.2	1.0	.2
7	.....	.08	.08	1.3	1.1	.7	22	.03	.08	.4	1.2	1.0	.1
8	.....	.08	.08	1.3	1.1	.6	23	.03	.14	.5	1.2	1.0	.1
9	.....	.07	.08	1.3	1.1	.6	24	.03	.08	.5	1.2	1.0	.1
10	.....	.07	.14	1.3	1.1	.6	25	.05	.07	.6	1.2	1.0	.06
11	.....	.07	.11	1.3	1.1	.5	26	.07	.07	.7	1.2	1.0	.03
12	.....	.06	.20	1.3	1.1	.4	27	.06	.07	.8	1.2	1.0	.00
13	.....	.06	.14	1.3	1.1	.4	28	.06	.07	.8	1.2	1.0	.00
14	.....	.06	.14	1.3	1.1	.4	29	.06	.....	.8	1.2	1.0	.00
15	.....	.06	.13	1.3	1.1	.3	30	.07	.....	1.0	1.2	.9	.00
							31	.07	.....	1.0	.....	.9	.....

Monthly discharge of Laguna Seca near Coyote, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 17-31	0.07	0.01	0.046	1.3
February	.14	.06	.075	4.2
March	1.0	.07	.326	20.0
April	1.3	1.0	1.23	73.2
May	1.2	.9	1.06	65.2
June	.9	.00	.376	22.4
The period	.....	.....	.....	186

LAGUNA SECA AT COYOTE, CALIF.

LOCATION.—In La Laguna Seca grant, at highway crossing just above junction with Coyote River, half a mile northwest of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1916, to August 14, 1918 (discharge measurements only).

DISCHARGE MEASUREMENTS.—Made by wading at or near highway culvert, 200 feet above mouth.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Laguna Seca at Coyote, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 5	Charles Leidl		1.7	May 23	H. D. McGlashan		2.6
Mar. 23	do		3.9	June 27	do		.9
May 2	H. D. McGlashan		4.0	Aug. 5	do		.2

ALAMEDA CREEK BASIN.

ALAMEDA CREEK AT SUNOLGLEN, CALIF.

LOCATION.—In SE. ¼ sec. 7, T. 4 S., R. 1 E., at Sunol dam, 1 mile below junction with Arroyo de la Laguna and 1 mile west of Sunolglen, Alameda County.

DRAINAGE AREA.—620 square miles (measured by Spring Valley Water Co.).

RECORDS AVAILABLE.—October 4, 1900, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on upstream face of dam on left bank. Previous to 1914 a staff gage on upstream side of dam on right bank was used.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 400 feet above dam. Heavy weights and stay line are used for high-water measurements to insure correct position of current meter.

CHANNEL AND CONTROL.—The concrete dam acts as a control for the station. Bed above and below dam consists of gravel and boulders; shifts during high water.

EXTREMES OF DISCHARGE.—1901–1918: Maximum mean daily discharge, 14,700 second-feet March 7, 1911; minimum, no flow for part of nearly every year.

DIVERSIONS.—See Spring Valley Water Co.'s aqueduct near Sunolglen, page 98.

REGULATION.—None.

ACCURACY.—The dam has been rated in accordance with the cooperative agreement between the Spring Valley Water Co. and the city of San Francisco. Current-meter measurements have been obtained by both parties and a rating curve developed which has been accepted by both.

COOPERATION.—Records showing million gallons per day furnished by Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Daily discharge, in second-feet, of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	July.	Aug.	Sept.
1	61	20	0.9	.....	0.7	6	.....	29	19
2	61	13	.9	.....	.6	6	.....	29	19
3	57	12	.9	.....	.6	4.5	.....	29	19
4	53	10	.9	0.1	.5	4.0	.....	29	19
5	57	9	.8	.1	.2	4.5	.....	28	19
6	57	10	.8	.4	.4	1.5	.....	28	19
7	61	9	.8	.4	.5	.8	.....	27	19
8	66	9	.8	.6	.6	1.7	.....	27	19
9	66	8	.8	.4	.6	.6	.....	27	19
10	66	8	.8	.4	2.2	.5	.....	27	19
11	66	7.5	.6	.4	119	.5	.....	27	19
12	69	6.5	.6	.4	562	.5	.....	11	74
13	69	9	.6	.4	362	.4	12	11	101
14	69	4.6	.6	.4	176	.3	14	26	127
15	69	3.2	.6	.4	50	.2	17	26	155
16	69	3.1	.5	.4	22	.2	22	25	74
17	73	3.1	.5	.6	11	.2	28	25	53
18	66	2.3	.5	.1	13	.1	36	24	51
19	104	2.0	.5	.2	570	.1	34	23	50
20	91	1.4	.5	.1	326	.1	32	23	48
21	73	1.4	.3	73	147	.1	32	22	46
22	66	1.4	.3	33	70	.....	31	22	45
23	61	1.4	.3	12	35	.....	30	22	42
24	73	1.4	.3	64	28	.....	29	21	40
25	73	1.2	.3	19	19	.....	29	21	38
26	69	1.1	.3	5.5	11	.....	29	21	36
27	66	1.1	.3	1.3	9.	.....	29	20	34
28	66	.9	.....	1.0	9	.....	29	20	32
29	61	.9	.....	.....	8.5	.....	29	20	31
30	79	.9	.....	.....	7	.....	29	20	7.5
31	73	.....	.....	.....	7	.....	29	20	.....

NOTE.—Creek dry Dec. 28 to Feb. 3 and Apr. 22 to July 12. Flow during summer due to release of water from Calaveras reservoir.

Monthly discharge of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	104	53	68.1	4,190
November	20	.9	5.41	322
December	.9	.0	.52	32.0
February	73	.0	7.66	425
March	570	.2	82.9	5,100
April	6	.0	1.09	64.9
July	34	.0	16.8	1,030
August	29	11	23.5	1,440
September	155	7.5	43.1	2,560
The year	570	.0	21.0	15,200

ALAMEDA CREEK NEAR NILES, CALIF.

LOCATION.—In Niles Canyon, one-eighth mile below first Southern Pacific Co. bridge above Niles, one-fourth mile above highway bridge, and 1¼ miles northeast of Niles, Alameda County.

DRAINAGE AREA.—633 square miles (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Gurley electric printing water-stage recorder on right bank at highway water tank 1,800 feet above highway bridge. Previous to January 15, gage was a Spring Valley Water Co. type water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 800 feet below gage, or by wading.

CHANNEL AND CONTROL.—Gravel; not permanent. Banks are high; channel straight from gage to some distance below suspension bridge. Control at gage solid rock and boulders.

DIVERSIONS.—Spring Valley Water Co. obtains water from the gravels at lower end of Livermore Valley, above station. (See Spring Valley Water Co's aqueduct near Sunolglen.) Water for irrigation is diverted on right bank at Niles dam, about 1 mile above station.

REGULATION.—Spring Valley Water Co. has under construction a large storage reservoir on Calaveras Creek From Calaveras reservoir water was released October 1 to about November 2, and July 15 to September 30.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements covering entire range of stage, were obtained. Rating curves are well defined. Daily discharge determined by averaging the results obtained by applying mean gage height for short period to rating table. Special care was exercised in making discharge measurements, maintaining water-stage recorder and other equipment and compiling record. Records excellent for this type of station.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek, near Niles, Calif., during the period Aug. 3, 1917, to Sept. 30, 1918.

[Made by State Water Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 3.....	1.21	33	Mar. 11.....	1.75	106	Mar. 20.....	2.54	389
Sept. 7.....	1.21	34	11.....	1.71	102	20.....	2.40	310
Oct. 22.....	1.41	56	12.....	2.10	196	21.....	1.95	182
			12.....	3.23	762	22.....	1.62	88
1918.			12.....	3.78	1,170	23.....	1.34	47
Jan. 3.....	.33	0.2	12.....	3.71	1,050	28.....	.86	9.7
Feb. 21.....	1.77	107	12.....	3.19	744	July 25.....	.99	16
21.....	1.56	67	13.....	2.40	326	30.....	1.06	20
21.....	1.49	62	13.....	2.44	336	Aug. 30.....	1.04	17
22.....	1.11	21	14.....	1.90	162	Sept. 13.....	1.88	134
22.....	1.09	22	14.....	1.78	117	13.....	1.86	136
23.....	1.04	18	15.....	1.40	53	14.....	2.50	299
26.....	.86	9.8	16.....	1.21	34	14.....	2.09	180
26.....	.83	8.2	18.....	.95	14	15.....	1.50	66
27.....	.59	3.0	19.....	3.17	826	16.....	1.30	40
27.....	.57	2.2	19.....	3.87	1,210	17.....	1.26	40
Mar. 4.....	.47	1.2	19.....	3.30	798	28.....	.88	8.4
11.....	1.83	119	19.....	3.17	755			

Daily discharge, in second-feet, of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58.5	22.5	1.0	0.0	0.2	1.5	3.5	0.2	0.1	.....	26.5	8.5
2	53	11.5	1.0	.1	.2	1.5	.5	.2	.1	.....	19.5	5.0
3	49	7.5	1.0	.2	.2	1.0	.5	.1	.1	.....	23	5.0
4	49	5.5	1.0	.2	.2	1.0	.5	.1	.1	.....	21	2.5
5	50.5	5.0	1.0	.2	.3	1.0	.5	.1	.1	.....	22.5	4.0
6	49	5.5	1.0	.2	.5	1.0	.5	.1	.1	.....	22	4.0
7	53	6.0	.5	.1	.5	2.0	.5	.1	.1	.....	22	10
8	53	5.0	.3	.1	.5	2.0	.4	.1	.1	.....	23	10
9	51.5	4.5	.2	.1	.5	1.5	.5	.1	.1	.....	21	9.0
10	51.5	3.5	.4	.0	.4	2.5	.5	.1	.1	.....	16.5	7.5
11	53	3.0	.5	.2	.4	103	.4	.2	.1	.....	18.5	10
12	54	3.0	.5	.2	.4	575	.4	.2	.1	.....	12.5	31.5
13	55	1.5	1.0	.3	.5	376	.4	.2	.....	.....	9.5	95.5
14	58.5	1.5	1.5	.4	.5	151	.3	.1	.....	.....	19	187
15	55	1.5	.5	.4	.5	63	.3	.1	.....	4.5	11.5	68
16	56.5	1.5	.5	.4	.5	33	.3	.1	.....	9.5	19	43.5
17	58.5	1.0	.5	.4	1.0	17	.3	.1	.....	2.0	22	36.5
18	51.5	1.0	.5	.4	.5	16.5	.2	.1	.....	.1	19	36
19	85.5	1.0	.5	.3	1.0	571	.2	.1	.....	.5	21.5	33
20	78.5	1.0	.4	.2	.5	335	.2	.1	.....	6.5	22	34
21	61	1.0	.3	.2	41.0	161	.2	.1	.....	10.5	22	29
22	55	1.0	.2	.2	30.5	85	.2	.1	.....	12	22	23.5
23	53	.5	.2	.2	18.0	50	.2	.1	.....	12.5	16.5	28.5
24	66.5	.5	.2	.2	37.5	33	.2	.1	.....	14	16.5	39.5
25	64	.5	.2	.2	28.0	23	.2	.1	.....	14.5	20	26
26	58.5	.5	.2	.2	8.0	17	.2	.1	.....	16.5	16.5	10
27	55	.5	.2	.2	3.0	13	.2	.1	.....	16.5	9.5	8.0
28	54	1.0	.2	.2	2.0	9.0	.2	.1	.....	17.5	15.5	7.0
29	54	1.5	.0	.2	.....	7.0	.2	.1	.....	19.5	18	7.5
30	61	1.0	.0	.2	.....	6.0	.2	.1	.....	18.5	18	8.5
31	62.5	.....	.0	.2	.....	6.0	.....	.1	.....	20.5	18	.....

NOTE.—No flow June 13 to July 14.

Monthly discharge of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	85.5	49	57	3,500
November	22.5	.5	3.35	199
December	1.5	.0	.50	30.7
January	.4	.0	.21	12.9
February	41	.2	6.33	352
March	575	1.0	86.0	5,290
April	3.5	.2	.43	25.6
May	.2	.1	.12	7.4
June	.1	.0	.04	2.4
July	20.5	.0	6.31	388
August	26.5	9.5	18.8	1,160
September	187	2.5	27.6	1,640
The year	575	.0	17.4	12,600

ALAMEDA CREEK NEAR DECOTO, CALIF.

LOCATION.—At Beard tract, 400 feet above mouth of Dry Creek, below Crandall Slough, 1 mile southwest of Decoto, Alameda County, and about 6¾ miles below station in Niles Canyon near Niles.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Gurley electric printing water-stage recorder on left bank, 400 feet above mouth of Dry Creek. Previous to January 15 gage was a Spring Valley Water Co. type water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from suspension foot bridge just above gage, or by wading. Measurements are also made at Rodriques bridge, 1¼ miles downstream, and results reduced by discharge of Dry Creek to give flow at gage.

CHANNEL AND CONTROL.—Gravel, sand, and silt; not permanent. Banks are high and steep, and have been cleared in vicinity of station. At flood stage some water leaves channel through Crandall Slough, 1½ miles above gage.

DIVERSIONS.—See Alameda Creek near Niles. In addition, water is pumped from creek at four points above station for irrigation purposes. Some water is returned to creek at three gravel-washing plants between mouth of canyon and station.

REGULATION.—See Alameda Creek near Niles.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements were obtained covering entire range of stage. Several well-defined rating curves were used during year. Daily discharge determined by applying mean gage height for fractional parts of a day to rating table. Special care was exercised in making discharge measurements, maintaining water-stage recorder and other equipment, and compiling record. Results excellent for this type of station.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek near Decoto, Calif., during the period Aug. 3, 1917, to Sept. 30, 1918.

[Made by State water commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*
Aug. 3	4.07	10	Mar. 15	5.45	67	Mar. 21	7.17	173
Oct. 23	4.83	40	15	5.35	63	21	7.02	164
			16	4.60	26	22	5.95	82
1918.			17	4.14	12	23	5.07	43
Mar. 12	7.93	244	18	3.59	2.4	28	3.46	0.6
12	11.02	863	19	11.07	928	Sept. 14	7.09	145
12	10.49	687	19	10.65	760	15	5.56	50
13	8.71	337	20	8.75	380	15	5.23	43
13	8.63	336	20	8.82	382	16	4.45	17
14	6.90	146	20	8.78	358	16	4.35	14
14	6.68	130	21	7.07	160	17	4.10	8.3
14	6.52	130	21	6.97	161	20	3.98	5.7
15	5.47	64	21	7.23	178			

Daily discharge in second-feet, of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Sept.	Day.	Oct.	Nov.	Mar.	Sept.
1	29.5	32.5	.....	.....	16	41	.....	25.5	16.5
2	28.5	8.5	.....	.....	17	40	.....	9.0	9.0
3	29	1.5	.....	.....	18	38.5	.....	2.0	6.5
4	26	.....	.....	.....	19	39.5	.....	416	5.5
5	26.5	.....	.....	.....	20	84	.....	368	5.
6	29	.....	.....	.....	21	55	.....	176	6.(
7	31.5	.....	.....	.....	22	42	.....	82.5	2.0
8	34.5	.....	.....	.....	23	38.5	.....	43.0	.3
9	35	.....	.....	.....	24	45.5	.....	26.0	2.5
10	36	.....	.....	.....	25	52.5	.....	6.5	3.5
11	38	.....	.....	.....	26	49.5	.....	.5	1.5
12	39	.....	322	.....	27	45.5	.....	.5	.....
13	41	.....	420	.....	28	43	.....	.....	.....
14	41	.....	161	103	29	39	.....	.....	.....
15	41	.....	63.5	47	30	44	.....	.....	.....
					31	53.5	.....	.....	.....

NOTE.—No flow on days for which no discharge is given.

Monthly discharge of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	84	26	40.5	2,491
November	32.5	0	1.42	84.5
March	420	0	68.4	4,210
September	103	0	6.96	414
The year	420	0	9.94	7,200

SPRING VALLEY WATER CO.'S AQUEDUCT NEAR SUNOLGLEN, CALIF.

LOCATION.—In sec. 12, T. 4 S., R. 1 W., at Brightwide weirs, 2½ miles west of Sunolglen, Alameda County.

RECORDS AVAILABLE.—April 6, 1903, to September 30, 1918.

GAGE.—Spring Valley water-stage recorder in pool above the weirs.

DISCHARGE.—Computed from gage-height record showing head over four rectangular bronze weirs, each having a 30-inch crest.

EXTREMES OF DISCHARGE.—1903–1918: Maximum mean daily discharge reported, 47 second-feet March 21, 1914.

ACCURACY.—The weirs were very carefully installed and much care is exercised in their maintenance. There is no velocity of approach.

COOPERATION.—Records showing thousand gallons per day furnished by Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Daily discharge, in second-feet, of Spring Valley Water Co.'s Aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	34	26	23	23	34	32	33	28	25	34	30
2	34	34	25	23	16.1	34	32	33	29	23	25	31
3	34	34	25	23	15.6	33	32	33	29	22	34	30
4	34	34	25	23	25	33	32	33	28	23	34	29
5	34	33	25	23	23	33	32	34	28	24	33	28
6	34	33	25	23	22	32	32	34	28	23	34	29
7	34	32	25	23	23	32	33	34	27	22	34	29
8	35	32	25	23	25	32	32	33	27	23	34	29
9	34	31	23	23	28	31	33	34	27	23	33	29
10	34	31	25	23	29	32	32	33	28	23	31	29
11	34	30	25	23	24	33	32	34	27	24	32	28
12	34	30	26	23	23	32	32	33	26	28	34	25
13	34	30	26	23	28	33	32	34	26	33	34	24
14	34	30	26	23	28	33	32	33	26	35	34	28
15	34	30	25	23	29	32	32	32	25	35	34	29
16	33	30	25	23	29	32	32	32	24	35	33	29
17	34	29	23	23	27	32	32	32	25	34	34	28
18	34	28	26	23	26	32	32	31	24	31	34	28
19	35	29	24	22	28	32	32	31	25	29	32	28
20	36	28	25	22	29	33	31	32	25	33	34	25
21	35	28	25	23	26	34	32	31	24	34	32	24
22	34	28	24	23	30	32	33	31	20	34	33	23
23	34	27	24	23	33	33	32	30	24	34	33	33
24	34	27	24	23	32	32	32	30	25	34	33	33
25	34	27	24	23	35	32	32	30	25	34	32	30
26	34	26	24	22	34	32	32	30	24	34	33	33
27	34	26	24	22	34	32	34	30	24	34	31	33
28	34	26	24	12.6	33	32	33	29	24	34	30	33
29	34	26	24	17.8	.....	32	34	26	23	33	28	33
30	34	26	23	23	.....	32	33	28	19.0	25	30	34
31	34	.....	23	23	.....	32	.....	28	.....	34	30	.....

Monthly discharge of Spring Valley Water Co.'s Aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	33	34.1	2,100
November	34	26	29.6	1,760
December	26	23	24.6	1,510
January	23	12.6	22.4	1,380
February	35	15.6	27.1	1,510
March	34	31	32.4	1,990
April	34	31	32.3	1,920
May	34	26	31.6	1,940
June	29	19.0	25.5	1,520
July	35	22	29.4	1,810
August	34	25	32.5	2,000
September	34	23	29.1	1,730
The year	36	12.6	29.2	21,200

CRANDALL SLOUGH NEAR CENTERVILLE, CALIF.

LOCATION.—Just below crossing of Centerville-Alvarado highway, 1½ miles northwest of Centerville, Alameda County.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Stevens water-stage recorder (8-day type) about 300 feet below highway crossing. Stream in one channel at this point.

DISCHARGE MEASUREMENTS.—Left channel—made from cable one-fourth mile below gage; right channel—made from footbridge 500 feet below gage.

CHANNEL AND CONTROL.—Grazing land.

EXTREMES OF DISCHARGE.—Creek dry all year.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

No discharge measurements were made, as there was no flow during the year.

LAGUNA CREEK AT IRVINGTON, CALIF.

LOCATION.—At outlet of lagoon, one-fourth mile north of Irvington, Alameda County.

DRAINAGE AREA.—10.8 square miles (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Vertical staff on left bank just below outlet of lagoon; read by A. Peixotto.

DISCHARGE MEASUREMENTS.—Made by floats near gage.

CHANNEL AND CONTROL.—Bed overgrown with tule; current very sluggish.

DIVERSIONS.—Water is diverted from Mission and Rose creeks for irrigation purposes.

REGULATION.—Natural storage in lagoon.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

The following discharge measurement was made by engineers of State Water Commission:

March 14, 1918: Gage height, 1.35 feet; discharge, 0.50 second-feet.

Daily discharge, in second-feet, of Laguna Creek at Irvington, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1	.....	2	7	2	16	.....	4	4	.....
2	.....	2	7	1	17	.....	4	4	.....
3	.....	2	7	1	18	.....	4	4	.....
4	.....	2	6	1	19	.....	9	3	.....
5	.....	2	6	1	20	.....	9	3	.....
6	.....	2	5	.....	21	2	9	3	.....
7	.....	2	5	.....	22	2	9	3	.....
8	.....	2	4	.....	23	2	9	3	.....
9	.....	2	4	.....	24	3	9	3	.....
10	.....	3	4	.....	25	2	8	3	.....
11	.....	3	4	.....	26	2	8	3	.....
12	.....	3	4	.....	27	2	8	3	.....
13	.....	3	4	.....	28	2	8	2	.....
14	.....	4	4	.....	29	.....	8	2	.....
15	.....	4	4	.....	30	.....	8	2	.....
					31	.....	8	.....	.....

NOTE.—No flow Oct. 1 to Feb. 20 and May 6 to Sept. 30.

Monthly discharge of Laguna Creek at Irvington, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
February	0.3	0.0	0.06	3.3
March	.9	.2	.52	32.0
April	.7	.2	.40	23.8
May	.2	.0	.02	1.2
The year	.9	.0	.08	60.3

DRY CREEK NEAR DECOTO, CALIF.

LOCATION.—Just below Niles-Alvarado highway bridge, one-fourth mile above junction with Alameda Creek, and 1 mile southwest of Decoto, Alameda County.

DRAINAGE AREA.—9.4 square miles above floor of valley (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Lietz water-stage recorder on right bank 500 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge just above gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting. Banks high and cleared in vicinity of station.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Stream dry all year except as follows: March 19, discharge 22.5 second-feet; March 20, discharge 8 second-feet.

Discharge measurements of Dry Creek near Decoto, Calif., during the year ending Sept. 30, 1918.

[Made by State Water Commission.]

Date	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 19	2.00	24
19	1.75	15
20	1.40	2.5

SAN PABLO CREEK BASIN.

SAN PABLO CREEK NEAR SAN PABLO, CALIF.

LOCATION.—In NE. ¼ sec. 11, T. 1 N., R. 4 W., 800 feet below San Pablo dam and 5 miles east of San Pablo, Contra Costa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Vertical staff in two sections 800 feet below the dam; low-water section is fastened to an alder tree on left bank 50 feet below the cable; high-water section fastened to an alder tree on right bank 120 feet above the low-water section. Read by employees of East Bay Water Co.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above low-water gage or by wading.

CHANNEL AND CONTROL.—Fine gravel; fairly permanent. Banks are steep and covered with brush; will overflow at high stages. Channel is straight for 150 feet above and 150 feet below the cable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet for 50 minutes February 21 (discharge, 620 second-feet); no flow October 1 to February 20 and May 19 to September 30.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by San Pablo dam above station.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to tenths twice daily; more frequently during storms. Daily discharge ascertained by applying mean daily gage height to the rating curve except February 21, 23, March 11, and 12, when hourly discharge was averaged. Records fair.

Discharge measurements of San Pablo Creek near San Pablo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Barkley and Green	1.25	10	Mar. 11	Barkley and Green	5.00	405
22	do	.90	1.5	11	do	2.50	131
23	do	5.40	445	12	do	5.50	470
23	do	6.50	590	12	J. W. Barkley	2.30	86
23	do	5.45	417	27	do	1.00	7.0
23	do	3.90	295				

Daily discharge, in second-feet, of San Pablo Creek near San Pablo, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Day.	Feb.	Mar.	Day.	Feb.	Mar.
1	.....	a 1	11	.....	87	21	85	5
2	.....	a 1	12	.....	116	22	7	5
3	.....	a 1	13	.....	25	23	160	5
4	.....	a 1	14	.....	a 1	24	a 1	5
5	.....	a 1	15	.....	a 1	25	a 1	5
6	.....	a 1	16	.....	a 1	26	a 1	5
7	.....	a 1	17	.....	a 1	27	a 1	5
8	.....	a 1	18	.....	a 1	28	a 1	2
9	.....	a 1	19	.....	43	29	.....	1
10	.....	13	20	.....	5	30	.....	1
						31	.....	.....

a Estimated by observer.

NOTE.—No flow Oct. 1 to Feb. 20 and May. 19 to Sept. 30. Discharge estimated Apr. 1–30, 0.2 second-feet; May 1–18, 0.05 second-feet.

Monthly discharge of San Pablo Creek near San Pablo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	160	0	9.2	511
March	116	1	11.1	683
April	.....	.....	.2	11.9
May	.....	.....	.03	1.8
The year	160	0	1.7	1,208

SAN PABLO CREEK AT SAN PABLO, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 1 N., R. 3 W. (unsurveyed), between Southern Pacific and Atchison, Topeka & Santa Fe railway tracks, half a mile north of San Pablo, Contra Costa County, and 2 miles above San Pablo Bay.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Staff gage in two sections on right bank; first section inclined; second section vertical; read by employees of East Bay Water Co.

DISCHARGE MEASUREMENTS.—Made from cable 12 feet above the gage or by wading.

CHANNEL AND CONTROL.—Sand and small gravel; shifting. Banks are steep, brushy, and will overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 3.45 p. m. March 11 (discharge, 371 second-feet); no flow October 1 to February 20 and April 24 to September 30.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by San Pablo dam.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read to half-tenths twice daily; and more often during storms. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record and measurements furnished by East Bay Water Co.

Discharge measurements of San Pablo Creek at San Pablo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Taylor and Howe	1.95	68	Feb. 23	Taylor and Howe	2.25	111
21	do	1.20	35	Mar. 11	Howe and Casey	2.82	220
21	do	1.02	25	11	do	1.97	100
21	do	1.00	20	11	do	4.30	342
22	do	.85	12	11	do	4.57	357
23	do	3.60	243	11	do	4.05	286

Daily discharge, in second-feet, of San Pablo Creek at San Pablo, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1		2	2	11		106	0.7	21	26	9	0.1
2		2	1	12		114	.7	22	12	9	.6
3		2	1	13		27	1	23	76	9	.3
4		2	1	14		14	1.2	24	2	9	
5		2	.6	15		9	1.2	25	2	9	
6		2	.6	16		9	1.2	26	2	9	
7		2	.5	17		9	1	27	2	9	
8		2	.5	18		9	.6	28	2	9	
9		2	1.2	19		55	.1	29		9	
10		5	1	20		12	.1	30		7	
								31		4.5	

NOTE.—No flow Oct. 1 to Feb. 20 and Apr. 24 to Sept. 30. Gage not read Feb. 24 and 25; discharge estimated.

Monthly discharge of San Pablo Creek at San Pablo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	76	0	4.4	244
March	114	4.5	15.5	953
April	2	0	.6	35.7
The year	114	0	1.7	1232.7

KERN RIVER BASIN.

KERN RIVER NEAR KERNVILLE, CALIF.

LOCATION.—In sec. 14, T. 23 S., R. 32 E., at base of Fairview Mountain, in Tulare County, in Kern National Forest, 3 miles above Salmon Creek and about 15 miles north of Kernville, Kern County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank about 1 mile above mouth of Tobias Creek. Original gage was vertical staff in three sections fastened to overhanging willow tree on left bank about 160 feet above recorder. From April 1 to September 14, 1913, readings were taken from a temporary staff gage in two sections located one-fourth mile upstream. The readings were reproduced to the original datum by a relation curve. The first gage was replaced March 17, 1914, by a vertical staff in two sections, 7 feet downstream from the original one, on the same bank and at the same datum. The recorder was installed September 15, 1913, in the same pool and at the same datum.

DISCHARGE MEASUREMENTS.—Made from cable about 90 feet below recorder or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.79 feet at 9 a. m. May 5 (discharge, 1,850 second-feet); minimum stage from water-stage recorder, −0.40 foot at 3 p. m. February 18 (discharge, 200 second-feet).

1912–1918: Maximum stage recorded, 8.8 feet from water-stage recorder at 4 p. m. January 17, 1916 (discharge, 9,690 second-feet); minimum stage recorded, −0.75 foot January 6, 1913 (discharge, 142 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not changed since station was established. Rating curve well defined below 6,000 second-feet and is an extension above. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—Station maintained in cooperation with Southern California Edison Co. through H. W. Dennis, construction engineer.

Discharge measurements of Kern River near Kernville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 5	−0.24	236
5	−0.24	237

Daily discharge, in second-feet, of Kern River, near Kernville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	262	240	242	234	237	298	860	1,110	1,080	1,360	421	312
2	268	240	242	232	238	315	860	1,210	1,240	1,240	470	290
3	275	240	234	232	234	312	725	1,320	1,520	1,180	435	278
4	268	236	228	234	234	310	652	1,600	1,810	1,110	394	265
5	262	234	238	236	236	298	630	1,770	2,040	1,040	364	262
6	255	248	238	236	236	325	630	1,680	2,310	950	346	250
7	255	252	228	240	305	488	608	1,520	2,450	892	325	240
8	255	248	222	238	240	435	652	1,440	2,450	834	312	242
9	252	245	222	220	234	335	725	1,240	2,500	775	302	240
10	252	240	224	220	232	361	750	1,140	2,600	750	290	240
11	255	242	224	222	230	565	802	1,010	2,800	675	290	238
12	260	240	220	232	227	545	860	980	3,000	630	290	236
13	262	238	218	240	224	452	890	980	3,000	675	298	234
14	260	234	220	230	222	428	775	1,110	3,110	675	367	245
15	262	234	220	230	220	432	750	1,140	2,800	608	364	245
16	262	236	216	238	216	432	775	1,080	2,450	565	335	240
17	268	238	220	240	245	424	860	1,040	2,500	525	315	236
18	258	238	222	240	220	488	980	1,010	2,800	505	300	228
19	255	236	224	236	234	545	1,040	1,010	3,220	505	290	220
20	255	237	222	218	258	545	1,110	1,110	3,000	505	278	216
21	255	237	222	212	268	545	1,180	1,210	3,000	488	268	212
22	252	238	220	222	292	525	1,280	1,240	2,600	470	262	245
23	250	242	218	228	298	505	1,280	1,240	2,360	452	258	288
24	248	240	228	230	302	525	1,240	1,280	1,120	432	252	262
25	248	240	228	230	310	565	1,280	1,320	1,860	404	252	240
26	245	240	242	231	315	565	1,240	1,280	1,730	388	258	232
27	242	240	242	232	318	585	1,180	1,180	1,730	370	262	265
28	242	240	238	233	298	585	1,180	1,080	1,680	370	265	397
29	240	240	234	234	.....	630	1,180	1,010	1,560	364	280	775
30	240	240	234	235	.....	675	1,180	950	1,360	355	292	1,110
31	240	.....	232	236	.....	750	.....	950	.....	373	300	.....

NOTE.—No gage-height record Nov. 20–21, Jan. 26 to Feb. 1, Feb. 10–14, and July 7–8; discharge interpolated.

Monthly discharge of Kern River near Kernville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	275	240	255	15,700
November	252	234	240	14,300
December	242	216	228	14,000
January	240	212	232	14,300
February	318	216	254	14,100
March	750	298	477	29,300
April	1,280	608	938	55,800
May	1,770	950	1,200	73,800
June	3,110	1,080	2,290	136,000
July	1,360	355	660	40,600
August	470	252	314	19,300
September	1,110	212	299	17,800
The year	3,110	212	615	445,000

KERN RIVER NEAR BAKERSFIELD, CALIF.[1]

LOCATION.—In sec. 2, T. 29 S., R. 28 E., at mouth of lower canyon, 5 miles northeast of Bakersfield, Kern County.

DRAINAGE AREA.—2,345 square miles.

RECORDS AVAILABLE.—January 1, 1894, to June 30, 1907, and March 1, 1908, to September 30, 1918.

GAGE.—Water-stage recorder on left bank at footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Shifting sand.

EXTREMES OF DISCHARGE.—1896–1918: Maximum stage recorded, January 26, 1914 (discharge, 18,287 second-feet); minimum stage recorded, September 15, 1898 (discharge, 80 second-feet).

DIVERSIONS.—Several small diversions on main river and South Fork for irrigation. Water diverted at and below Kernville, for power development is returned to the river above the station.

REGULATION.—No information.

ACCURACY.—Records considered good.

COOPERATION.—Complete record, except run-off in acre-feet, furnished by Kern County Land Co., through A. K. Warren, engineer.

Daily discharge, in second-feet, of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	289	290	306	336	285	434	1,128	1,376	1,054	1,370	376	309
2	300	284	314	340	272	431	1,228	1,279	1,146	1,391	411	324
3	301	278	328	346	277	446	1,254	1,296	1,370	1,270	450	311
4	308	277	322	339	286	463	1,148	1,374	1,632	1,198	476	287
5	307	287	314	338	299	466	1,038	1,579	1,899	1,148	457	280
6	298	304	318	335	300	464	982	1,735	2,151	1,043	425	281
7	292	305	332	331	306	463	974	1,679	2,405	988	400	272
8	291	324	328	321	330	585	947	1,550	2,509	852	381	269
9	291	325	321	314	361	815	983	1,474	2,553	843	373	261
10	290	331	332	304	312	642	1,045	1,324	2,607	816	356	252
11	285	330	319	295	301	597	1,100	1,213	2,747	782	333	251
12	277	338	319	279	299	892	1,141	1,107	2,850	737	323	241
13	272	335	314	295	298	1,015	1,213	1,065	3,054	687	314	243
14	283	337	303	309	299	910	1,303	1,050	3,126	676	304	249
15	295	325	298	312	292	800	1,151	1,122	3,098	723	335	257
16	296	323	296	308	278	727	1,099	1,169	2,737	672	369	280
17	295	315	292	311	277	687	1,038	1,105	2,439	633	350	279
18	291	317	298	320	307	688	1,206	1,107	2,345	595	331	277
19	286	325	302	319	347	868	1,302	1,096	3,052	571	321	272
20	277	311	306	316	330	1,124	1,337	1,110	3,040	553	312	267
21	279	295	307	306	356	1,008	1,360	1,208	3,162	551	305	254
22	278	299	308	288	381	1,004	1,449	1,258	2,949	542	299	242
23	280	315	304	282	407	980	1,505	1,316	2,658	534	302	243
24	282	312	304	280	430	931	1,550	1,326	2,321	528	288	286
25	286	306	311	288	436	942	1,563	1,380	2,027	483	279	271
26	293	303	316	293	435	953	1,572	1,401	1,805	435	274	264
27	301	301	319	292	427	945	1,533	1,378	1,641	411	263	296
28	317	307	340	295	430	995	1,511	1,234	1,584	398	252	362
29	314	314	330	281	.....	952	1,490	1,166	1,532	398	253	469
30	304	308	329	279	.....	973	1,418	1,133	1,454	376	277	706
31	303	.....	337	284	.....	1,043	.....	1,088	.....	367	301	.....

[1] Station also known as at "first point of measurement."

Monthly discharge of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	322	266	292	18,000
November	349	275	311	18,500
December	366	290	315	19,400
January	348	271	308	18,900
February	443	264	334	18,500
March	1,155	426	782	48,100
April	1,614	865	1,252	74,500
May	1,769	1,022	1,280	78,700
June	3,478	1,025	2,298	137,000
July	1,454	365	729	44,800
August	483	246	338	20,800
September	955	227	295	17,600
The year	3,478	227	711	515,000

NOTE.—Record of maximum, minimum, and mean discharge furnished by Kern County Land Co.; maximum and minimum were determined from absolute maximum and minimum gage heights as recorded by company's water-stage recorder. Run-off in acre-feet computed by engineers of United States Geological Survey.

TULARE LAKE BASIN.

TULARE LAKE IN KINGS COUNTY, CALIF.

LOCATION.—At head gate at corner of north-south and east-west levees on G. Albert Smith ranch, at quarter corner between secs. 8 and 17, T. 21 S., R. 20 E., about 5 miles southwest of Stratford.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15, 1906, to September 30, 1918 (incomplete). All published records give actual depth of water on the lowest point of the lake bed.

GAGE.—Vertical staff in three sections, two fastened to the head gate, high-water section at junction of Smith's levee and the Empire levee, 2 miles north; read by Ernest Coonradt. Gage readings reduced to depth of water from the following data: Elevation of bottom of lake, 179.1 feet above mean sea level; elevation of zero of gage, 176.4 feet.

During 1906 and a part of 1907 the readings were made from a gage near the entrance of Kings River near Lemoore, at the middle of sec. 4, T. 21 S., R. 20 E.; zero of that gage was at elevation 175.1 feet. May 11, 1907, a staff gage was set near Corcoran, with its datum at the same elevation, and was used until July 30, 1909. July 28, 1910, a vertical staff was installed on the section line just south of the corner of secs. 27, 28, 33, and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore, near Stratford post office; elevation of the zero of this gage, 171.0 feet. August 20, 1913, a vertical staff in four sections was installed in main north and south waterway, 4 to 6 miles southeast of Stratford; its zero was also at elevation 171.0 feet. Sections No. 1 and No. 2 were 1 mile south of gage used in 1910 in sec. 3, T. 21 S., R. 20 E. No. 3 was in sec. 10 and No. 4 was in sec. 15, 1 mile and 2 miles, respectively, south of sections Nos. 1 and 2.

Present gage was installed May 15, 1914, on account of the rebuilding of the levees. The high-water section on the levee near by, added July 16, 1916, was used up to October 28, 1916. The present high-water section was installed October 28, 1916.

EXTREMES OF STAGE.—Maximum depth recorded during year, 6.45 feet October 6: minimum depth recorded, 2.4 feet September 22.

1906–1918: Maximum depth, 14.0 feet June 21, 1907; the lake was empty a period in 1906, the last part of October to the last part of December, 1914, and the last part of November, 1916.

The lake is roughly rectangular in shape and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had a maximum depth of 12.4 feet, an average length of 20 miles, a width of 13.5 miles, and an area of about 274 square miles; the water's edge was 3 miles from the town of Corcoran, and the water surface about 12 feet below.

The lake bed resembles a flat saucer. The flat, level area in the bottom is about 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural outflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

Daily depth, in feet, of Tulare Lake in Kings County, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										4.8		
2									5.1			
3												
4												
5		n 6.0			(se)							
6	6.45											
7												
8												
9						6.25						
10			5.6									
11		s 6.1						5.7				2.8
12						sw6.4						
13					n 5.6							
14							6.2					
15												
16												
17									5.0			
18											n 3.3	
19		n 6.0				6.4						
20												
21	n 6.2											
22					6.1							2.4
23												
24												
25		n 5.8				6.4		5.3				
26				5.7								
27			s 5.8							4.0	3.1	
28	n 6.1											
29						6.35						
30												
31												

n Wind blowing from north; s wind from south; se wind from southeast; sw wind from southwest.

DEER CREEK AT HOT SPRINGS, CALIF.

LOCATION.—Below footbridge at forest supervisor's headquarters in Sequoia National Forest, half a mile below Hot Springs, Tulare County. Tyler Creek enters about 2½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on left bank, 30 feet below footbridge; read by employees of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from highway bridge, 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.2 feet March 27 (discharge, 36 second-feet); minimum stage recorded, 0.35 foot July 26 to September 16 (discharge, 1.2 second-feet).

1910–1918: Maximum stage recorded, 4.5 feet at 4 p. m. January 27, 1916 (discharge, from extension of rating curve, about 540 second-feet); minimum stage recorded, 0.24 foot August 14 to 16, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 2 and 40 second-feet and is an extension above. Gage read to half-tenths once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by Charles Leidl:

November 1, 1917: Gage height, 0.47 foot; discharge, 3.1 second-feet.

Daily discharge, in second-feet, of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	1.7	3.0	3.8	3.8	3.8	6.5	16	6.5	3.8	1.7	1.2	1.2
2	1.7	3.4	5.2	3.8	3.8	6.5	14	6.5	3.8	1.7	1.2	1.2
3	1.7	3.8	3.8	3.8	3.8	8.2	14	6.5	3.8	1.7	1.2	1.2
4	1.7	3.8	3.8	3.8	3.8	9.8	14	6.5	3.8	1.7	1.2	1.2
5	1.7	3.8	3.8	3.8	3.8	6.5	14	6.5	3.8	1.7	1.2	1.2
6	1.7	5.2	3.8	3.8	3.8	6.5	9.8	6.5	3.8	1.7	1.2	1.2
7	1.7	5.2	3.8	3.8	16	9.8	9.8	6.5	3.8	1.7	1.2	1.2
8	1.7	a 5.2	3.8	3.8	9.8	14	9.8	8.2	3.8	1.7	1.2	1.2
9	1.7	a 5.2	3.8	4.3	5.2	9.8	9.8	9.8	3.4	1.7	1.2	1.2
10	1.7	a 5.2	3.8	3.8	3.8	16	9.8	8.2	3.4	1.7	1.2	1.2
11	1.7	a 5.2	3.8	3.8	6.5	14	9.8	a 8.2	2.8	1.7	1.2	1.2
12	1.7	a 5.2	3.8	3.8	3.8	14	9.8	a 8.2	2.8	1.7	1.2	1.2
12	1.7	a 5.2	3.8	6.5	3.8	18	14	8.2	2.8	1.7	1.2	1.2
14	1.7	a 3.8	3.8	5.2	3.8	16	12	8.2	2.8	1.7	1.2	1.2
15	1.7	a 3.8	3.8	6.5	3.8	12	12	6.5	2.8	1.7	1.2	1.2
16	1.7	a 3.8	3.8	3.8	3.8	9.8	12	6.5	2.1	1.7	1.2	1.2
17	1.7	a 3.8	3.8	3.8	3.8	9.8	9.8	6.5	2.1	1.5	1.2	1.5
18	1.7	a 3.8	3.8	3.8	6.5	9.8	12	6.5	2.1	1.5	1.2	1.5
19	1.7	a 3.8	3.8	3.8	3.8	30	12	6.5	2.1	1.5	1.2	1.5
20	1.7	3.8	3.8	3.8	6.5	18	9.8	6.5	2.1	1.5	1.2	1.5
21	1.7	3.8	3.8	3.8	6.5	16	9.8	6.5	1.7	1.5	1.2	1.7
22	1.7	3.8	3.8	3.8	9.8	14	9.8	6.5	1.7	1.5	1.2	1.7
23	1.7	3.8	3.8	3.8	6.5	9.8	9.8	6.5	1.7	1.5	1.2	1.7
24	1.7	3.8	a 3.8	3.8	6.5	9.8	9.8	6.5	1.7	1.5	1.2	1.7
25	1.7	3.8	a 3.8	3.8	8.2	9.8	9.8	6.5	1.7	1.5	1.2	1.7
26	1.7	3.8	a 3.8	3.8	8.2	9.8	9.8	6.0	1.7	1.2	1.2	1.7
27	1.7	3.8	a 3.8	3.8	6.5	36	9.8	6.0	1.7	1.2	1.2	2.8
28	2.8	3.8	3.8	3.8	6.5	14	a 9.0	5.2	1.7	1.2	1.2	2.8
29	2.8	3.8	3.8	3.8	.....	14	a 8.2	5.2	1.7	1.2	1.2	2.8
30	2.8	3.8	3.8	3.8	.....	14	a 7.4	5.2	1.7	1.2	1.2	2.8
31	2.8	.....	3.8	3.8	.....	16	.....	3.8	.....	1.2	1.2	.....

a Interpolated.

Monthly discharge of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2.8	1 7	1.84	113
November	5.2	3.0	4.13	246
December	5.2	3.8	3.85	237
January	6.5	3.8	4.04	248
February	16	3.8	5.80	322
March	36	6.5	13.2	812
April	16	7.4	10.9	649
May	9.8	3.8	6.69	411
June	3.8	1.7	2.62	156
July	1.7	1.2	1.55	95.3
August	1.2	1.2	1.20	73.8
September	2.8	1.2	1.55	92.2
The year	36	1.2	4.77	3,460

TULE RIVER NEAR PORTERVILLE, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 25, T. 21 S., R. 28 E., below highway bridge near McFarland ranch, about a mile above mouth of South Fork and 6 miles east of Porterville, Tulare County. North and Middle forks of Tule River unite about 9 miles above station.

DRAINAGE AREA.—266 square miles.

RECORDS AVAILABLE.—May 1, 1901, to September 30, 1918.

GAGE.—Vertical staff in four sections on right bank, 75 feet below bridge. Original gage was on the same bank 200 feet below bridge and at same datum. There have been several changes in the number and kinds of staff sections, but the same datum has been maintained. Gage read by G. B. Kieffer.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift slightly during high water. Left bank low and wooded; subject to overflow above a stage of about 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 7 p. m. March 18 (discharge, 900 second-feet); minimum stage recorded, 0.09 foot at 6 p. m. September 5 (discharge, 0.7 second-foot).

1901–1918: Maximum stage recorded, 11.0 feet at 11.30 p. m. January 17, 1916 (discharge, determined from extension of rating curve, about 6,780 second-feet); minimum stage recorded, 0.09 foot at 6 p. m. September 5, 1918 (discharge, 0.7 second-foot).

DIVERSIONS.—Several small irrigation ditches divert water above the station.

REGULATION.—Power is developed on the Middle Fork and on the North and South forks of the Middle Fork.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve fairly well defined below 3,000 second-feet, and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying gage height to discharge table. Records good.

Discharge measurements of Tule River near Porterville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 31	0.78	16
June 24	.84	23

Daily discharge, in second-feet, of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	19	32	38	30	60	243	115	69	7.5	1.2	0.9
2	11	19	32	35	29	61	230	116	62	7	1.2	.9
3	13	19	32	38	30	68	195	120	58	6.5	1.1	.9
4	11	20	34	35	30	68	150	126	56	6	1.1	.7
5	11	20	35	31	30	68	143	126	52	5	1.1	.7
6	10	27	35	35	30	72	137	121	51	4.8	1.1	.9
7	11	32	37	35	54	79	132	118	48	4.0	1.1	1.1
8	11	29	37	34	52	154	132	133	47	4.0	1.1	1.2
9	10	30	38	38	38	102	135	139	43	3.4	1.1	1.3
10	11	31	37	40	38	99	146	121	41	2.8	1.1	1.5
11	12	30	35	40	34	195	152	108	38	2.5	.9	1.7
12	11	32	34	40	32	218	152	105	38	2.5	.8	1.9
13	11	32	33	44	32	360	132	110	34	2.4	.8	1.9
14	11	30	34	47	30	195	133	96	32	2.1	.7	2.1
15	13	30	33	47	32	164	125	90	27	2.1	.7	1.5
16	14	30	33	46	30	152	120	88	25	2.1	.7	1.9
17	17	30	33	46	40	146	118	80	23	1.9	.7	1.9
18	20	31	33	46	135	427	126	77	22	1.7	.7	1.7
19	20	30	33	43	77	665	139	80	20	1.6	.7	1.7
20	19	30	34	42	63	445	154	77	20	1.4	.9	2.0
21	19	27	33	41	72	270	172	75	35	1.2	.9	2.0
22	19	30	33	38	77	243	174	72	23	1.2	1.0	2.1
23	18	30	33	38	77	184	174	68	20	1.1	.7	7
24	18	30	37	37	64	195	164	74	20	1.1	.7	6
25	19	30	35	35	90	184	164	74	18	1.1	.9	4.8
26	20	30	40	37	72	174	150	74	16	1.2	.9	4.2
27	20	30	42	38	64	410	139	74	14	1.2	.8	3.7
28	20	30	41	35	63	270	128	73	13	1.2	.7	4.4
29	20	30	42	34	.....	243	126	69	13	1.4	.9	6.5
30	20	30	40	32	.....	243	126	64	10	1.3	.9	11
31	19	.....	40	30	.....	243	.....	67	.....	1.1	.9	.....

Monthly discharge of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	9	15.1	928
November	32	19	28.3	1,680
December	42	32	35.5	2,180
January	47	30	38.6	2,370
February	135	29	51.6	2,870
March	665	60	208	12,800
April	243	118	150	8,930
May	139	64	94.5	5,810
June	69	10	32.9	1,960
July	7.5	1.1	2.72	167
August	1.2	.7	.91	56.0
September	11	.7	2.67	159
The year	665	.7	55.2	39,900

SOUTH FORK OF TULE RIVER NEAR PORTERVILLE,[1] CALIF.

LOCATION.—Opposite Indian School in Tule Indian Reservation, 2 miles below mouth of Rocky Creek, 7 miles southeast of Success, 8 miles above junction with Tule River, and 14 miles southeast of Porterville, Tulare County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 10, 1910, to September 30, 1918.

GAGE.—Vertical staff on right bank 30 feet above pump house, installed July 18, 1916; read by employees of Indian Service. Original gage was a vertical staff fastened to an alder tree 100 feet above pump house at a different datum.

DISCHARGE MEASUREMENTS.—Made from cable 1½ miles below gage or by wading.

CHANNEL AND CONTROL.—Rough; boulders and gravel; shifts slightly during high water. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.4 feet at 4 p. m. March 19 (discharge, 151 second-feet); minimum stage recorded, 0.48 foot August 8 to 24 and September 14 (discharge, 0.7 second-foot).

1910–1918: Maximum stage recorded, 8 feet at 8 a. m. January 26, 1914 (discharge, determined from extension of rating curve, about 2,750 second-feet); minimum stage recorded, 0.48 foot August 8–24 and September 14, 1918 (discharge, 0.7 second-foot).

DIVERSION.—Several small irrigation ditches, having a total capacity of about 12 second-feet, divert water above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 4 second-feet and 200 second-feet and is an extension above. Gage read to tenths once daily to April 30 and to quarter-tenths once daily, sometimes twice, from July 1. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage was not read. Records good.

COOPERATION.—Gage-height record furnished by United States Indian Service, through Frank A. Virtue, superintendent.

Discharge measurements of South Fork of Tule River near Porterville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 29	0.92	7.0
June 24	.90	6.5

[1] Originally known as "near Success."

Daily discharge, in second-feet, of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	4.2	6.5	9.5	9.5	a 9.5	24	55	.....	4.2	0.8	1.0
2	4.2	6.5	9.5	9.5	a 9.5	24	46	.....	4.2	.8	1.4
3	4.2	6.5	9.5	9.5	a 9.5	a 24	46	.....	3.8	.8	1.4
4	4.2	6.5	9.5	a 9.5	9.5	24	38	.....	3.8	.8	1.8
5	4.2	6.5	9.5	9.5	9.5	18	31	.....	3.3	.8	1.8
6	4.2	14	9.5	9.5	9.5	24	31	.....	3.3	.8	1.8
7	4.2	9.5	9.5	9.5	55	77	31	.....	3.3	.8	1.4
8	4.2	9.5	9.5	9.5	55	31	31	.....	2.8	.7	2.2
9	4.2	9.5	9.5	14	46	31	31	.....	2.2	.7	2.2
10	4.2	9.5	9.5	14	46	31	38	.....	1.8	.7	2.2
11	4.2	9.5	9.5	14	38	31	38	.....	1.4	.7	2.4
12	4.2	9.5	9.5	a 14	38	89	38	.....	1.4	.7	2.4
13	4.2	9.5	9.5	a 14	38	55	46	.....	1.4	.7	2.4
14	4.2	9.5	a 9.5	14	38	38	31	.....	1.4	.7	.7
15	4.2	9.5	a 9.5	14	a 38	38	31	.....	1.4	.7	6
16	4.2	9.5	a 9.5	a 14	a 29	38	31	.....	1.2	.7	4.2
17	6.5	9.5	9.5	14	24	31	31	.....	1.2	.7	4.2
18	6.5	9.5	a 9.5	14	24	103	31	.....	1.2	.7	1.2
19	6.5	9.5	9.5	14	18	151	31	.....	1.2	.7	1.2
20	6.5	9.5	9.5	14	24	89	31	.....	1.1	.7	1.2
21	6.5	9.5	9.5	14	24	65	31	.....	1.3	.7	1.2
22	6.5	9.5	9.5	14	31	55	31	.....	1.3	.7	1.2
23	6.5	9.5	a 9.5	9.5	24	55	31	.....	1.2	.7	4.2
24	6.5	9.5	9.5	9.5	24	55	31	6.5	1.0	.7	4.2
25	6.5	9.5	9.5	9.5	24	55	31	.....	1.0	.8	4.2
26	6.5	9.5	9.5	9.5	24	46	31	.....	1.0	.8	3.8
27	6.5	9.5	14	a 9.5	24	89	31	.....	1.0	.8	7
28	6.5	9.5	14	9.5	24	55	24	.....	1.0	.8	14
29	7	9.5	9.5	9.5	.....	55	24	.....	.8	.8	9.5
30	6.5	9.5	a 9.5	9.5	.....	55	24	.....	.8	.8	12
31	6.5	.....	9.5	9.5	.....	46	.....	.....	.8	.8	.....

a Gage not read, discharge interpolated.

Monthly discharge of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7	4.2	5.33	328
November	14	6.5	9.15	544
December	14	9.5	9.79	602
January	14	9.5	11.5	707
February	55	9.5	27.2	1,510
March	151	18	51.7	3,180
April	55	24	33.5	1,990
July	4.2	.8	1.83	113
August	.8	.7	.75	46.1
September	14	.7	3.48	207
The year	.....	.....	.....	.....

KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 27, T. 17 S., R. 28 N., at J. O. Carter's ranch, 1½ miles southwest of Three Rivers, Tulare County. South Fork enters three-fourths mile and North Fork 3 miles above the station.

DRAINAGE AREA.—520 square miles.

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1918.

GAGE.—Vertical staff gage in four sections on left bank a few feet above cable and one-fourth mile back of observer's house; read by Carter and Vickroy. The original gage was installed by the U. S. Geological Survey at same location and datum. December 5, 1912, the Weather Bureau gage was installed. For about two years the two gages were read interchangeably, according to varying conditions of repair of each. October 19, 1914, the Geological Survey repaired the upper section of the Weather Bureau gage and has used this gage to October 27, 1917, when the entire gage was rebuilt.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.1 feet at 7 a. m. March 19 (discharge, 1,570 second-feet); minimum stage recorded, 4.60 feet at 4.45 p. m. September 15 (discharge, 36 second-feet).

1903–1918: Maximum stage recorded, 13.5 feet at 11 a. m. January 17, 1916 (discharge, from extension of rating curve, about 14,700 second-feet); minimum stage recorded, 4.35 feet August 22, 1914 (discharge, 30 second-feet).

DIVERSIONS.—Several small ditches divert water for local irrigation and domestic use above the station.

REGULATION.—Power is developed on the Middle and East forks but effect is thought to be small.

ACCURACY.—Stage-discharge relation changed March 19. Rating curves well defined between 40 and 4,000 second-feet; extended above. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Gage not read April 21 to June 22; daily discharge not estimated but the monthly mean was estimated from the flow of the North and South forks and from the record for 1913. Records excellent except those for extreme high stages, which are probably good and for estimated periods, which are fair.

Discharge measurements of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	Charles Leidl	4.78	51	June 23	Charles Leidl	6.20	659
28	do	4.77	48	July 27	J. F. Kunesh	4.88	78

Daily discharge, in second-feet, of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	55	47	54	55	52	139	660	.....	370	62	42
2	52	45	52	55	55	145	700	.....	322	71	42
3	55	47	60	55	52	152	830	.....	322	62	42
4	48	50	57	55	51	187	422	.....	322	62	48
5	47	42	52	52	60	165	422	.....	300	55	48
6	46	58	55	54	52	165	450	.....	259	62	42
7	52	81	55	54	255	365	422	.....	259	62	48
8	50	65	51	54	139	390	580	.....	222	55	48
9	47	65	48	57	255	247	930	.....	188	62	42
10	47	62	52	54	65	478	660	.....	172	55	42
11	44	62	52	50	88	1,180	980	.....	172	48	42
12	46	65	52	50	217	580	700	.....	188	48	48
13	52	60	48	60	65	545	660	.....	172	55	42
14	47	68	47	63	92	418	660	.....	142	48	42
15	45	55	44	66	77	340	785	.....	123	55	36
16	52	52	65	58	130	340	545	.....	128	62	42
17	58	58	50	60	155	318	660	.....	128	55	42
18	55	52	50	60	275	1,080	830	.....	102	48	42
19	50	55	51	58	295	1,400	880	.....	102	48	42
20	50	52	50	55	275	660	880	.....	91	48	42
21	50	55	52	63	130	1,300	.....	.....	91	42	48
22	50	52	50	52	165	480	.....	.....	80	48	42
23	50	52	46	57	169	450	.....	660	80	48	71
24	46	52	47	57	148	480	.....	510	71	48	66
25	47	50	50	55	206	510	.....	510	80	42	66
26	48	52	65	55	159	480	.....	450	71	42	59
27	47	52	98	57	152	1,030	.....	480	73	42	66
28	48	52	68	62	152	660	.....	450	62	48	71
29	50	51	62	55	.....	620	.....	422	71	48	345
30	50	52	55	55	.....	930	.....	345	71	42	280
31	48	.....	60	51	.....	660	.....	.....	62	42	.....

Monthly discharge of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	58	44	49.4	0.095	0.11	3,040
November	81	42	55.4	.107	.12	3,300
December	98	44	54.8	.105	.12	3,370
January	66	50	56.3	.108	.12	3,460
February	295	51	142	.273	.28	7,890
March	1,400	139	545	1.05	1.21	33,500
April	.....	422	[a] 789	1.52	1.70	46,900
May	.....	.....	[a] 1,060	2.04	2.35	65,200
June	.....	345	[a] 777	1.49	1.66	46,200
July	370	62	158	.304	.35	9,720
August	71	42	52.1	.100	.12	3,200
September	345	36	65.9	.127	.14	3,920
The year	.....	36	317	.610	8.28	230,000

[a] Estimated.

NORTH FORK OF KAWEAH RIVER AT KAWEAH, CALIF.

LOCATION.—In SW. ¼ sec. 2, T. 17 S., R. 28 E., at highway bridge in Sequoia National Forest, half a mile north of Kaweah, Tulare County, and 2 miles above junction with Kaweah River, Manikin Creek enters one-fourth mile below and Sheep Creek 2½ miles above gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1910, to September 30, 1918.

GAGE.—Staff gage in two sections on right bank; low water section is inclined and fastened to abutment of bridge; upper section is vertical and fastened to sycamore tree 20 feet below bridge. Previous to flood of January, 1914, gage was vertical staff fastened to right abutment. Original datum has been maintained. Gage read by J. T. Weckert.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Solid rock and sand; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet night of March 18–19 (discharge, 900 second-feet); minimum stage recorded, 0.12 foot August 31, September 1 and 6–8 (discharge, 1.7 second-feet).

1910–1918: Maximum stage recorded, 10.2 feet at 7 p. m. January 25, 1914 (discharge from extension of rating curve, about 7,400 second-feet); minimum stage recorded, 0.35 foot August 27, 1913 (discharge, 0.8 second-foot). Lower stages recorded gave larger discharges.

DIVERSION.—About 20 second-feet is diverted by several small ditches for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed October 3. Rating curves coincide above 2.2 feet, are well defined between 2 and 500 second-feet, and are extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of North Fork of Kaweah River at Kaweah, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 28	Charles Leidl	0.48	6.9
June 23	.....do	.96	24
July 27	J. F. Kunesh	.38	5.0

Daily discharge, in second-feet, of North Fork of Kaweah River near Kaweah, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.5	7	9	12	10	41	198	154	63	15	3.5	1.7
2	5.5	7.5	9	12	10	46	171	156	65	24	2.8	1.8
3	5.0	7.5	9	11	10	46	147	179	62	26	2.5	1.8
4	5.5	7.5	9.5	11	11	46	132	184	63	21	2.5	1.9
5	5.5	7.5	9	11	11	47	132	163	59	15	2.5	1.8
6	5.5	8	9	12	11	48	136	171	59	12	2.4	1.7
7	5.5	8	9	12	37	168	122	147	56	11	2.5	1.7
8	5.5	8	9	12	32	149	158	176	55	10	2.5	1.7
9	5.5	8	9	12	21	86	163	147	51	9.5	2.6	1.8
10	5.5	8.5	9	13	18	58	179	136	46	9	2.9	1.8
11	6	8.5	9	13	17	405	195	127	43	8	2.5	2.1
12	6	8.5	8.5	13	17	219	219	163	39	8	2.5	2.3
13	6	9	8.5	14	16	235	156	136	37	8	2.5	2.5
14	6	9	8.5	15	16	127	145	127	35	7.5	2.4	2.5
15	6	8.5	8	16	16	116	156	118	33	7.5	2.8	2.5
16	6	8	8.5	14	16	112	168	110	32	7.5	2.9	2.5
17	6	8	9	14	33	108	195	102	30	7	3.0	2.5
18	6	8	9	13	33	184	219	100	27	6.5	3.0	2.5
19	6	8	9	12	24	695	219	97	26	6.5	2.8	2.5
20	6.5	8	9	12	24	206	232	102	28	6.5	2.5	2.5
21	6.5	8	9	12	27	136	245	100	28	6.5	2.4	2.5
22	6.5	8	9	12	46	138	228	99	27	6.5	2.4	2.6
23	6.5	8	9	11	48	134	242	91	24	6	2.5	2.8
24	6.5	8	9	11	45	151	238	97	22	6	2.5	3.0
25	6.5	8.5	11	11	65	127	225	91	21	5.5	2.3	3.2
26	6.5	8.5	18	11	49	140	190	102	20	5.5	2.1	3.3
27	6.5	9	22	10	36	430	190	82	16	5	2.1	3.3
28	7	9	13	10	35	184	163	86	16	5	2.0	3.4
29	7	8.5	12	10	.....	195	171	76	15	4.8	1.9	3.8
30	7	9	12	10	.....	201	156	77	15	4.0	1.8	5.5
31	7	.....	12	10	.....	212	.....	72	.....	3.7	1.7	.....

Monthly discharge of North Fork of Kaweah River at Kaweah, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7	5	6.08	374
November	9	7	8.18	487
December	22	8.5	10.1	621
January	16	10	12.0	738
February	65	10	26.2	1,460
March	695	41	167	10,300
April	245	122	183	10,900
May	184	72	122	7,500
June	65	15	37.1	2,210
July	26	3.7	9.16	563
August	3.5	1.7	2.49	153
September	5.5	1.7	2.52	150
The year	695	1.7	48.9	35,500

SOUTH FORK OF KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 8, T. 18 S., R. 29 E., on Mehrten ranch, 500 feet above mouth of Cinnamon Creek, 4½ miles southeast of Three Rivers, Tulare County, and 5 miles above junction with Kaweah River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1911, to September 30, 1918.

GAGE.—Vertical staff fastened to large boulders on right bank; read by D. N. Mehrten.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; rough and fairly permanent. Banks subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet March 19 and May 5–7 (discharge, 217 second-feet); minimum stage recorded, 1.6 feet September 3–5 (discharge, 1.5 second-feet).

1911–1918: Maximum stage recorded, 6.3 feet at 7.45 a. m. January 17, 1916 (discharge from extension of rating curve, about 1,880 second-feet); minimum stage recorded, 1.6 feet September 3–5, 1918 (discharge, 1.5 second-feet).

DIVERSIONS.—Two small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 19. Rating curves coincide above 2.6 feet, are well defined below 500 second-feet, and are extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of South Fork of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 28	Charles Leidl	1.80	6.4
June 23	....do	2.90	69
July 27	J. F. Kunesh	1.86	6.0

Daily discharge, in second-feet, of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.5	7.5	7	9.5	6.5	20	64	146	130	76	5.5	1.6
2	7.5	7.5	7	9.5	6.5	20	60	158	134	69	5	1.6
3	7.5	7.5	7	9.5	6.5	20	51	172	141	64	4.7	1.5
4	7.5	7.5	7	10	6.5	20	49	202	146	58	4.5	1.5
5	7.5	7.5	7	10	6.5	20	47	217	151	52	4.5	1.5
6	7.5	7.5	7	10	7	21	45	217	158	45	4.5	1.7
7	7	10	7	10	30	30	45	217	166	34	4.5	1.7
8	7	8.5	7	10	12	54	45	202	172	28	4.1	1.7
9	7	7.5	7	10	8.5	12	45	172	166	22	4.1	1.9
10	7	7.5	7	10	7.5	30	47	114	158	17	4.1	2.0
11	7	7.5	7	10	7	30	47	124	151	15	4.0	2.1
12	7	7.5	7	10	7	41	45	134	146	14	4.0	2.2
13	7	7.5	7	12	7.5	69	82	146	134	13	4.0	2.3
14	7	7.5	7	10	7.5	54	54	146	130	12	3.8	2.3
15	7	7.5	7	9.5	7.5	45	54	158	120	12	3.8	2.3
16	6.5	7.5	7	8.5	7	41	54	166	114	11	3.6	2.3
17	6.5	7.5	7	8	7.5	40	58	172	111	10	3.4	2.2
18	6.5	7.5	7	8	20	38	58	178	106	9.5	3.2	2.2
19	6.5	7.5	7	7.5	16	217	58	186	97	9.5	3.2	2.3
20	6.5	7	6.5	7.5	15	124	58	186	90	9	3.2	2.4
21	6.5	7	6.5	7.5	29	82	82	186	97	8.5	3.1	2.5
22	6.5	7	6.5	7	20	58	82	186	106	8.5	2.9	2.7
23	7	7	6.5	7	20	56	90	186	100	8	2.7	2.9
24	7	6.5	7	7	20	54	92	172	97	8	2.7	2.9
25	7	6.5	7	7	25	49	97	172	94	7.5	2.6	3.1
26	7	6.5	7.5	7	20	172	97	172	90	7.5	2.5	3.3
27	7.5	6.5	8.5	7	20	82	106	166	85	7.5	2.2	3.3
28	7.5	7	9	7	20	69	114	151	82	6.5	2.1	3.3
29	7.5	7	9	7	.....	66	124	141	78	6.5	2.0	4.0
30	7.5	7	9.5	7	.....	64	134	130	76	6	1.9	4.1
31	7.5	.....	9.5	6.5	.....	64	.....	124	.....	6	1.7	.....

Monthly discharge of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7.5	6.5	7.06	434
November	10	6.5	7.37	439
December	9.5	6.5	7.29	448
January	12	6.5	8.60	529
February	30	6.5	13.3	739
March	217	12	56.8	3,490
April	134	45	69.5	4,140
May	217	114	168	10,300
June	172	76	121	7,200
July	76	6	21.3	1,310
August	5.5	1.7	3.49	215
September	4.1	1.5	2.40	143
The year	217	1.5	40.6	29,400

KINGS RIVER NEAR SANGER, CALIF.

LOCATION.—In NW. ¼ sec. 8, T. 13 S., R. 24 E., half a mile below new highway bridge at Piedra, near mouth of canyon, southwest of Red Mountain, and 12 miles northeast of Sanger, Fresno County.

DRAINAGE AREA.—1,740 square miles.

RECORDS AVAILABLE.—September 3, 1895, to September 30, 1918.

GAGE.—U. S. Weather Bureau inclined staff on left bank opposite original gage; read by C. D. Moore. Original gage was inclined staff on right bank. Friez water-stage recorder on right bank was used from April 18, 1903, to January 26, 1914, when it was destroyed by flood. Record on present gage began January 30, 1914. Same datum for all gages.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift slightly during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet at 7 a. m. June 12–14 (discharge, 13,500 second-feet); minimum stage recorded, 3.7 feet October 15–16, December 17–18, January 11–12 (discharge, 170 second-feet).

1895–1918: Maximum stage recorded, 21.8 feet during night of January 25, 1914, determined by leveling from flood marks (discharge, from extension of rating curve, about 59,700 second-feet); minimum stage recorded, 3.7 feet January 21, 1904 (discharge, 130 second-feet).

DIVERSIONS.—There is a small diversion for a flume used to float lumber to Sanger several miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 13. Rating curves well defined between 150 and 18,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Kings River near Sanger, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	Charles Leidl	3.78	197	June 21	Charles Leidl	11.12	10,100
Feb. 2	C. L. Kaupke	3.70	159	July 25	J. F. Kunesh	4.87	717
June 3	do	10.11	8,040	Aug. 27	Charles Leidl	4.04	288

Daily discharge, in second-feet, of Kings River near Sanger, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	205	205	205	245	205	490	2,660	4,220	5,130	3,530	675	475
2	245	205	205	245	205	490	3,010	5,310	5,910	3,530	740	400
3	245	205	205	225	205	490	2,120	5,130	8,650	4,360	708	378
4	245	205	205	205	205	490	1,820	6,770	9,700	2,890	675	355
5	245	205	205	205	205	605	1,640	8,150	10,600	2,440	585	310
6	245	205	205	205	205	845	1,640	7,650	10,900	2,220	555	310
7	205	225	205	205	245	2,020	1,820	6,990	10,900	2,220	555	310
8	205	245	205	205	518	2,020	2,020	7,210	11,500	1,920	475	290
9	205	245	205	205	290	1,230	1,920	4,800	10,900	1,820	475	270
10	205	245	205	205	290	1,470	2,020	3,940	11,200	1,630	450	270
11	205	225	205	188	290	3,660	2,660	3,400	12,500	1,540	425	270
12	205	205	205	170	290	3,400	3,140	4,800	12,500	1,450	400	270
13	205	205	205	245	245	3,010	3,140	4,360	12,800	1,270	400	270
14	205	205	205	245	245	1,550	2,890	5,500	12,100	1,270	400	290
15	170	205	205	245	290	1,390	2,120	5,910	9,700	1,270	450	270
16	170	205	205	245	245	1,310	2,660	4,360	9,150	1,110	425	270
17	205	205	188	205	290	1,160	3,270	4,800	7,430	1,110	400	270
18	205	205	170	205	435	1,640	3,940	4,800	9,150	1,030	400	270
19	205	205	205	205	335	6,330	3,940	5,500	8,650	1,030	400	270
20	205	205	205	205	360	3,010	3,660	6,330	8,650	1,110	378	270
21	205	205	205	205	462	2,020	4,220	6,120	10,600	955	355	290
22	205	205	205	205	670	1,920	4,650	6,330	8,650	955	355	645
23	205	205	205	205	705	1,920	4,960	6,330	6,330	880	355	585
24	205	205	205	205	845	1,920	5,130	6,330	5,310	810	310	528
25	205	205	205	205	1,090	1,820	5,150	6,120	4,220	740	270	475
26	205	205	205	205	545	1,730	4,360	5,310	3,800	708	270	425
27	205	225	360	205	545	2,330	4,220	4,500	3,940	675	270	378
28	205	205	290	205	545	2,020	4,360	3,660	3,940	615	270	355
29	205	205	245	205	.....	2,020	4,500	3,660	3,530	615	270	1,540
30	205	205	245	205	.....	2,220	4,360	3,530	3,400	615	270	4,360
31	205	.....	245	205	.....	2,440	.....	3,940	.....	615	270	.....

Monthly discharge of Kings River near Sanger, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	245	170	209	0.120	0.14	12,900
November	245	205	211	.121	.14	12,600
December	360	170	215	.124	.14	13,200
January	245	170	212	.122	.14	13,000
February	1,090	205	393	.226	.24	21,800
March	6,330	490	1,900	1.09	1.26	117,000
April	5,130	1,640	3,270	1.88	2.10	195,000
May	8,150	3,400	5,350	3.07	3.54	329,000
June	12,800	3,400	8,390	4.82	5.38	499,000
July	4,360	615	1,510	.868	1.00	92,800
August	740	270	427	.245	.28	26,300
September	4,360	270	522	.300	.33	31,100
The year	12,800	170	1,880	1.08	14.69	1,360,000

SAN JOAQUIN RIVER BASIN.

MAIN STREAM.

SAN JOAQUIN RIVER NEAR FRIANT, CALIF.

LOCATION.—In NW. ¼ sec. 5, T. 11 S., R. 21 E., 1½ miles northeast of Friant, Fresno County.

DRAINAGE AREA.—1,640 square miles at old location 2 miles upstream.

RECORDS AVAILABLE.—October 18, 1907, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on left bank, installed December, 9, 1913. Previous to that date the gage was a staff gage located on left bank in SE. ¼ sec. 34, T. 10 S., R. 21 E., about 4 miles northeast of Friant. Relation between old datum and new datum unknown.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage, or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Control is a solid rock dyke about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year unknown, incomplete record; minimum stage, from water-stage recorder, 3.28 feet December 17, 26, and January 28 (discharge, 231 second-feet).

1907–1918: Maximum stage recorded, 21.72 feet at 11.30 p. m. January 25, 1914 (discharge, 46,200 second-feet); minimum stage recorded, 3.25 feet October 17 to 19 and 22 to 29, 1913 (discharge, 170 second-feet).

DIVERSIONS.—Fresno Flume & Lumber Co. diverts about 10 second-feet from Stevenson Creek. This water is used for irrigation near Clovis.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek, and a small amount on Stevenson Creek at Shaver.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 240 and 18,000 second-feet and extended above. Water-stage recorder stopped three times during year and considerable record was lost. Mean daily gage height determined by averaging readings printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent when recorder was running and fair for estimated periods.

Discharge measurements of San Joaquin River near Friant, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	Charles Leidl[a]	3.85	396	July 26	J. F. Kunesh	5.16	931
June 21	....do	11.16	9,920	Aug. 26	Charles Leidl	4.21	582

Daily discharge, in second-feet, of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	June.	July.	Aug.	Sept.
1	.....	382	358	340	328	795	.....	.....	878	665
2	.....	364	331	313	322	822	.....	.....	932	600
3	.....	373	298	352	328	905	.....	.....	960	608
4	.....	361	349	361	288	878	.....	.....	932	613
5	.....	322	334	349	325	960	.....	.....	822	590
6	.....	370	331	352	319	1,020	.....	.....	850	595
7	.....	424	328	295	352	2,040	.....	.....	822	577
8	.....	410	319	340	795	4,130	.....	.....	795	568
9	.....	421	308	355	494	1,960	.....	.....	740	490
10	.....	400	265	355	394	1,400	.....	.....	715	530
11	.....	400	322	334	343	3,440	.....	.....	715	510
12	.....	361	322	298	388	3,830	.....	.....	613	494
13	.....	379	316	328	435	.....	.....	.....	690	452
14	.....	391	298	328	438	.....	.....	.....	715	502
15	.....	376	302	355	452	.....	.....	.....	715	1,240
16	.....	376	305	364	421	.....	.....	.....	715	850
17	.....	352	258	340	418	.....	.....	.....	690	690
18	.....	364	290	364	421	.....	.....	.....	640	600
19	.....	322	310	355	506	.....	.....	.....	526	572
20	.....	358	310	370	538	.....	.....	.....	600	554
21	.....	370	308	292	582	.....	9,400	.....	595	522
22	370	352	313	308	1,110	.....	9,900	.....	582	435
23	388	361	305	334	1,540	.....	7,700	.....	590	391
24	388	361	265	346	2,080	.....	5,910	.....	582	640
25	379	370	302	355	2,160	.....	.....	.....	577	586
26	388	340	282	343	1,020	.....	.....	990	494	542
27	379	355	424	310	905	.....	.....	960	572	526
28	376	358	394	265	850	.....	.....	960	586	435
29	340	346	382	285	.....	.....	.....	960	626	1,140
30	382	322	355	313	.....	.....	.....	960	640	7,010
31	370	.....	308	331	.....	.....	.....	878	665	.....

NOTE.—Discharge for periods for which gage height was not recorded estimated from flow of Kings River near Sanger and from the Weather Bureau gage heights at Friant as follows: Oct. 1-21, 430 second-feet; Mar. 13-31, 2,800 second-feet; Apr. 1-30, 3,000 second-feet; May 1-31, 5,000 second-feet; June 1-20, 9,400 second-feet; June 25-30, 4,700 second-feet; and July 1-25, 2,200 second-feet.

Monthly discharge of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	413	25,400
November	424	322	368	21,900
December	424	258	319	19,600
January	370	265	333	20,500
February	2,160	288	663	36,800
March	.....	.....	2,430	149,000
April	.....	.....	[a] 3,000	179,000
May	.....	.....	[a] 5,000	307,000
June	.....	.....	8,300	494,000
July	.....	.....	1,960	121,000
August	960	494	696	42,800
September	7,010	391	818	48,700
The year	.....	258	2,020	1,470,000

[a] Estimated.

SAN JOAQUIN RIVER NEAR NEWMAN, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 7 S., R. 9 E., at drawbridge on Hill's Ferry road, 300 feet below mouth of Merced River and 3½ miles northeast of Newman, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1912 to September 30, 1918.

GAGE.—Vertical staff fastened to upstream side of downstream support of draw span, 60 feet below the bridge in middle of stream. Gage read by Rasmus Lorensen.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and small gravel; shifts during high water. Banks subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.7 feet at 7 a. m. March 14 (discharge, 13,400 second-feet); minimum stage recorded, 1.65 feet September 5–11 (discharge, 130 second-feet).

1912–1918: Maximum stage recorded, 18 feet at 9 a. m. January 27, 1914 (discharge, 20.700 second-feet); minimum stage recorded, 1 foot October 5 and 8–18, 1913 (discharge, 50 second-feet).

DIVERSIONS.—Practically the entire low-water flow of main river and tributaries is diverted for irrigation, hence the low-water records show the amount of return water.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Stage-discharge relation not changed this year. Rating curve fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of San Joaquin River near Newman, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 1	J. F. Kunesh	1.73	139
June 26	Charles Leidl	11.90	8,840
July 23	J. F. Kunesh	3.07	365

Daily discharge, in second-feet, of San Joaquin River near Newman, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	145	135	200	222	170	2,440	6,520	4,000	3,230	5,010	255	135
2	145	135	200	222	170	1,820	6,390	3,600	3,320	3,800	238	135
3	135	135	200	230	170	1,480	6,130	4,000	3,600	3,320	230	135
4	140	140	215	230	162	1,160	5,870	4,000	3,800	3,140	230	135
5	145	145	215	230	162	925	5,490	4,550	4,220	2,780	230	130
6	145	145	222	230	170	770	5,490	5,250	5,010	2,600	215	130
7	145	145	230	230	170	870	5,370	5,250	5,490	2,360	215	130
8	145	145	230	222	185	7,170	5,010	5,370	6,130	2,040	215	130
9	145	145	222	222	230	9,370	4,550	5,370	6,780	1,750	208	130
10	145	155	215	230	265	7,040	4,110	5,010	7,040	1,540	200	130
11	140	155	215	230	230	7,040	3,800	4,550	7,300	1,340	192	130
12	135	162	215	230	200	8,750	3,410	4,110	7,720	1,160	185	135
13	135	162	215	230	200	10,700	3,500	3,600	8,150	1,040	170	155
14	140	162	215	230	178	13,400	3,500	3,230	8,450	925	155	162
15	145	162	215	238	178	10,700	3,500	3,500	8,750	870	155	155
16	145	162	208	245	170	9,530	3,320	3,700	8,750	720	155	162
17	145	162	200	245	185	7,300	3,320	3,410	8,750	630	155	155
18	145	162	208	255	185	8,000	3,320	3,140	8,750	550	155	155
19	145	162	208	255	185	6,910	3,410	3,320	8,750	550	155	178
20	140	170	215	245	230	11,200	3,500	3,410	8,900	510	150	170
21	140	170	208	245	255	12,600	3,600	3,800	9,210	475	150	170
22	140	170	208	245	355	11,000	4,000	4,110	9,530	440	150	170
23	140	170	200	245	3,500	11,500	4,440	4,110	9,690	395	150	162
24	135	178	200	245	2,600	11,500	4,770	4,550	9,530	368	150	155
25	135	185	208	238	6,390	10,800	4,890	4,770	9,050	355	150	155
26	145	185	208	222	4,110	10,000	4,770	4,890	8,750	330	150	155
27	145	185	215	215	3,050	8,900	4,660	5,010	8,450	305	145	155
28	145	185	222	208	2,690	9,210	4,550	4,660	8,150	295	145	155
29	145	185	222	200	.....	7,860	4,440	4,330	7,860	285	140	155
30	145	185	230	170	.....	6,910	4,330	3,900	6,910	275	140	155
31	140	.....	230	170	.....	6,390	.....	3,500	.....	265	140	.....

Monthly discharge of San Joaquin River near Newman, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	145	135	142	8,730
November	185	135	161	9,580
December	230	200	213	13,100
January	255	170	228	14,000
February	6,390	162	955	53,000
March	13,400	770	7,520	462,000
April	6,520	3,320	4,470	266,000
May	5,370	3,140	4,190	258,000
June	9,690	3,230	7,330	436,000
July	5,010	265	1,300	79,900
August	255	140	177	10,900
September	178	130	149	8,870
The year	13,400	130	2,240	1,620,000

FRESNO RIVER AND TRIBUTARIES.

FRESNO RIVER NEAR KNOWLES, CALIF.

LOCATION.—In N. ½ sec. 15, T. 8 S., R. 20 E., at Fresno crossing, 6 miles northeast of Knowles, Madera County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 16, 1911, to January 1, 1914; November 13, 1915, to September 30, 1918.

GAGE.—Vertical staff in two sections; low-water section is on left bank about 60 feet above bridge; high-water section is on right bank about 100 feet above bridge. There have been several changes in gage sections and the original datum probably has been maintained. Gage read by J. E. Gayman.

DISCHARGE MEASUREMENTS.—Made from cable about 300 feet below bridge or by wading.

CHANNEL AND CONTROL.—Bed consists of small boulders, gravel, sand, and outcroppings of bedrock; fairly permanent. A concrete control was installed November 4, 1916.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet at 12.30 p. m., March 19 (discharge, determined from extension of rating curve, about 2,710 second-feet); minimum stage recorded, 0.40 foot August 31 to September 2 (discharge, 0.7 second-foot).

1911–1914 and 1916–1918: Maximum stage recorded, 6.0 feet at 5 p. m. February 21, 1917 (discharge, determined from extension of rating curve, about 4,500 second-feet); minimum stage recorded, 0.40 foot August 31 to September 2, 1918 (discharge, 0.7 second-foot).

DIVERSIONS.—Water is diverted above the station for irrigation and lumbering.

REGULATION.—Diurnal fluctuation at low stages due to diversions above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 5 and 400 second-feet and is extended above. Gage read to quarter-tenths once or twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for high water, which are fair.

Discharge measurements of Fresno River near Knowles, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 31	J. F. Kunesh	0.72	5.3
31	....do	.74	5.5
Aug. 24	Charles Leidl	.53	1.4

Daily discharge, in second-feet, of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	5.5	8	12	11	63	201	112	74	32	2.5	0.7
2	5	5.5	9.5	12	11	63	175	119	69	32	2.5	.7
3	5	5	12	14	12	63	126	119	69	29	2.2	.8
4	5	5	15	14	11	63	126	119	69	29	2.2	.9
5	4.5	5	14	15	11	69	134	119	69	26	2.5	.9
6	4.5	5.5	14	14	11	69	126	119	74	26	2.2	.9
7	4.5	15	12	12	42	1,360	112	119	74	26	2.2	1.0
8	4.5	9.5	12	12	55	582	98	119	69	15	2.2	1.1
9	4.5	8	8	11	24	312	91	210	69	15	1.9	1.1
10	4.0	8	8	11	24	210	91	166	69	14	1.9	1.1
11	4.0	7.5	9.5	9.5	22	367	91	112	69	14	1.9	1.1
12	3.5	8	9.5	9.5	19	1,170	91	112	63	12	1.7	1.1
13	3.5	8	8	15	19	650	98	112	63	8	1.7	1.4
14	3.5	8	8	14	19	312	91	112	59	7.5	1.7	1.7
15	4.0	7.5	9.5	14	19	210	85	105	59	7.5	1.4	15
16	4.0	7.5	9.5	14	22	210	85	98	59	8	1.4	15
17	4.5	7.5	8	12	22	166	80	91	55	8	1.1	8
18	4.5	8	8	12	42	166	80	91	55	8	1.1	7
19	5	8	8	12	55	2,490	85	91	50	7.5	1.1	5.5
20	5.5	7.5	8	12	91	720	80	91	46	7.5	1.4	2.5
21	5	7.5	9.5	11	126	425	80	85	42	7	1.1	2.5
22	4.5	8	9.5	11	455	312	80	85	42	7	1.1	2.5
23	4.5	9.5	9.5	11	166	260	85	80	42	6	1.1	2.5
24	4.5	11	9.5	9.5	1,120	240	91	80	39	5.5	1.4	1.1
25	5	9.5	9.5	9.5	312	240	91	80	42	5.5	1.1	1.1
26	5	8	11	9.5	210	685	112	80	42	5	1.1	1.1
27	5	7.5	26	8	91	312	119	80	39	5	1.0	1.1
28	5.5	7.5	15	8	91	302	119	80	39	4.5	.9	2.5
29	5	8	12	9.5	.....	291	112	80	36	4.0	.8	2.5
30	5	8	12	9.5	.....	270	112	85	36	4.0	.8	26
31	5.5	.....	12	9.5	.....	210	.....	80	.....	3.5	.7	.....

Monthly discharge of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.5	3.5	4.61	283
November	15	5	7.80	464
December	26	8	10.8	664
January	15	8	11.5	707
February	1,120	11	111	6,160
March	2,490	63	415	25,500
April	201	80	105	6,250
May	210	80	104	6,390
June	74	36	56.1	3,340
July	32	3.5	12.5	769
August	2.5	.7	1.55	95.3
September	26	.7	3.68	219
The year	2,490	.7	70.3	50,800

MERCED RIVER AND TRIBUTARIES.

MERCED RIVER AT HAPPY ISLES BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Happy Isles Bridge, at power house 1½ miles southeast of Yosemite, Mariposa County.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 23, 1915, to September 30, 1918.

GAGE.—Friez water-stage recorder in masonry well on right bank about 20 feet below bridge. Previous to November 2, 1916, record is from a staff gage fastened to downstream side of large boulder which is used for the right abutment of the bridge.

DISCHARGE MEASUREMENTS.—Made from Clark Bridge, about one-half mile below gage, or by wading.

CHANNEL AND CONTROL.—Boulders; considered permanent. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder 6.55 feet at 1 a. m., June 12 (discharge, 3,180 second-feet); minimum stage, from water-stage recorder, 0.13 feet at 11 a. m., January 9 (discharge, 2.1 second-feet). Regulated by power plant above.

1915–1918: Maximum stage recorded, 6.68 feet at 12.15 a. m., June 10, 1917 (discharge, 3,320 second-feet); minimum stage from water-stage recorder, 0.13 feet at 11 a. m., January 9, 1918 (discharge, 2.1 second-feet).

ICE.—Stage-discharge relation possibly slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—Power plant above station; water returned to the river just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting recorder graph or by using planimeter for days during which there were wide fluctuations in stage. Daily discharge ascertained by applying mean daily gage height to rating table, except September 29 when hourly discharge was averaged. For periods of no record discharge estimated by comparison with the flow at Pohono Bridge (see footnote to daily discharge table). Records excellent except for periods when recorder did not work properly.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Merced River at Happy Isles Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	J. F. Kunesh	0.54	13	Sept. 15	Charles Leidl	2.25	239
Aug. 27	H. D. McGlashan	.93	30	17	.....do.....	1.65	114
29	Charles Leidl	1.03	40				

Daily discharge, in second-feet, of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27	17	16	17	56	337	846	1,100	910	105	60
2	26	17	17	16	60	328	952	1,380	798	116	51
3	25	16	15	15	76	256	1,170	1,620	685	106	45
4	25	14	15	17	88	218	1,380	1,740	599	99	39
5	24	14	15	15	88	209	1,380	2,050	513	91	36
6	24	19	13	12	86	220	1,280	2,280	427	80	32
7	24	19	13	13	92	233	1,170	2,420	382	70	29
8	23	18	15	12	79	256	1,040	2,470	328	64	29
9	22	17	16	10	66	314	746	2,520	328	60	29
10	22	17	15	10	84	343	585	2,570	297	56	28
11	22	18	15	12	111	373	495	2,720	269	54	26
12	22	18	14	13	86	388	554	2,820	233	52	25
13	21	18	15	12	81	355	795	2,820	220	50	27
14	20	17	15	14	80	300	1,070	2,720	208	49	154
15	20	17	14	14	86	306	1,040	2,520	196	47	272
16	19	17	13	15	93	337	746	2,240	194	45	158
17	18	17	15	15	95	414	795	1,740	184	44	116
18	18	17	15	15	112	500	712	1,830	172	42	86
19	17	15	15	.....	106	540	795	1,830	156	41	68
20	16	15	15	.....	100	615	970	1,920	158	40	56
21	16	15	14	.....	112	724	1,100	1,910	158	37	50
22	15	14	13	.....	124	856	1,140	1,900	147	35	54
23	14	14	16	.....	136	886	1,200	1,880	138	33	66
24	14	15	17	.....	158	892	1,240	1,870	126	32	67
25	13	15	19	.....	172	868	1,200	1,660	111	30	56
26	13	14	29	.....	172	751	970	1,460	99	33	48
27	14	15	26	.....	164	655	740	1,220	95	33	42
28	13	15	21	.....	154	675	585	970	93	37	56
29	14	15	18	.....	186	734	491	740	92	41	1,550
30	13	14	20	.....	225	746	491	825	92	46	1,000
31	15	.....	17	.....	292	.....	718	.....	93	54	.....

NOTE.—No gage-height record, intake pipe clogged, Oct. 13–24 and Jan. 19 to Feb. 28; discharge Oct. 13–24 interpolated; Jan. 19–31, estimated as 12 second-feet, and Feb. 1–28 as 32 second-feet. Staff gage read June 21 to July 5 and Sept. 7–10. No gage-height record Oct. 31, Nov. 23, Mar. 8, May 3, June 21–23–25, 27, 30, July 2, 4, 5, 14, Aug. 11–19 and Sept. 10: discharge interpolated.

Monthly discharge of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 181 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	27	13	19.0	0.105	0.12	1,170
November	19	14	16.1	.089	.10	958
December	29	13	16.3	.090	.10	1,000
January	17	10	13.0	.072	.08	799
February	.....	.....	[a]32.0	.177	.18	1,780
March	292	56	117	.646	.74	7,190
April	892	209	488	2.70	3.01	29,000
May	1,380	491	916	5.06	5.83	56,300
June	2,820	740	1,920	10.6	11.83	114,000
July	910	92	274	1.51	1.74	16,800
August	116	30	55.5	.307	.35	3,410
September	1,550	25	145	.801	.89	8,630
The year	2,820	10	334	1.85	24.97	241,000

[a] Estimated.

MERCED RIVER AT POHONO BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Pohono Bridge, 5 miles below Yosemite, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 2, 1916, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank 150 feet above the bridge. Datum lowered 0.8 foot September 4, 1918.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Control formed by boulders; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.05 feet at 5 a. m. June 12 (discharge, 4,000 second-feet); minimum stage recorded, 0.18 foot February 2 (discharge, 19 second-feet).

ICE.—No ice forms at the control because of rapids.

DIVERSIONS.—None.

REGULATION.—The power plant at Happy Isles causes diurnal fluctuation.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 1,000 second-feet, well defined between 1,000 and 6,000 second-feet, and extended above. Mean daily gage height determined by inspecting recorder graph except October 26 to February 2 and February 9, 13, 16, and August 27 to September 4, when staff gage was used. Daily discharge ascertained by applying the mean daily gage height to the rating table. Records good.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superinteudent of Yosemite National Park.

Discharge measurements of Merced River at Pohono Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	J. F. Kunesh	0.27	27	Aug. 29	Charles Leidl	0.56	56
Aug. 27	H. D. McGlashan	.51	47	Sept. 16	do	2.25	188

Daily discharge, in second-feet, of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	25	29	a 24	a 20	76	720	1,840	1,920	943	121	73
2	.....	25	29	a 24	19	90	768	2,080	2,260	1,090	133	71
3	.....	25	28	a 24	a 25	108	556	2,120	2,530	1,090	130	a 66
4	.....	25	27	a 24	a 30	134	472	2,620	2,720	792	115	60
5	.....	24	27	24	a 36	138	456	2,720	2,920	653	115	a 62
6	.....	28	26	a 23	42	136	488	2,530	3,020	596	105	a 64
7	.....	32	26	a 22	87	194	484	2,400	3,220	513	103	a 65
8	.....	31	25	a 22	50	176	552	2,040	3,320	441	.....	a 67
9	.....	30	24	21	48	152	672	1,580	3,120	422	.....	a 69
10	.....	29	24	a 21	a 48	182	768	1,300	3,320	392	.....	a 71
11	.....	29	23	a 21	a 49	279	866	1,150	3,520	334	.....	a 73
12	.....	30	23	21	a 50	243	943	1,240	3,730	297	.....	a 75
13	.....	29	23	a 22	50	196	838	1,640	3,620	277	.....	76
14	.....	29	24	a 24	a 47	186	696	2,080	3,520	266	.....	108
15	.....	28	24	a 25	a 44	186	720	2,000	3,220	245	.....	207
16	.....	28	a 24	26	41	203	792	1,540	2,920	236	.....	180
17	.....	28	a 24	a 26	48	217	970	1,640	2,260	221	.....	132
18	.....	28	a 24	a 26	a 49	255	1,180	1,540	2,260	207	.....	104
19	.....	28	a 24	a 26	a 49	274	1,240	1,760	2,220	192	.....	88
20	.....	27	a 24	26	50	236	1,400	2,120	2,260	190	.....	76
21	.....	27	a 25	a 25	51	238	1,640	2,220	2,440	184	.....	70
22	.....	27	a 25	a 24	66	266	1,960	2,260	2,040	174	.....	69
23	.....	26	a 25	23	62	282	2,080	2,300	1,720	161	.....	71
24	.....	26	a 25	a 23	74	322	2,000	2,260	1,440	150	.....	74
25	.....	26	a 25	a 22	62	364	1,840	2,170	1,150	134	.....	68
26	27	26	25	22	68	385	1,580	1,920	1,120	127	.....	65
27	a 26	26	a 25	a 22	69	361	1,440	1,500	1,120	121	49	64
28	26	26	a 25	a 21	71	328	1,500	1,270	1,090	120	a 52	65
29	26	25	a 25	21	.....	371	1,680	1,120	970	118	55	1,150
30	26	25	a 25	a 20	.....	468	1,610	1,090	891	118	61	1,270
31	26	.....	a 25	a 20	.....	601	.....	1,410	.....	117	65	.....

a Interpolated; no gage-height record.

NOTE.—Discharge Oct. 1-25 estimated as 31 second-feet; Aug. 8-26, 76 second-feet.

Monthly discharge of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	30.1	1,850
November	32	24	27.3	1,620
December	29	23	25.1	1,540
January	26	20	23.1	1,420
February	87	19	50.2	2,790
March	601	76	247	15,200
April	2,080	456	1,100	65,500
May	2,720	1,090	1,850	114,000
June	3,730	891	2,400	143,000
July	1,090	117	352	21,600
August	133	.....	82.2	5,050
September	1,270	60	161	9,580
The year	3,730	19	528	383,000

MERCED RIVER AT EXCHEQUER, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 13, T. 4 S., R. 15 E., just above remains of old dam at Exchequer, Mariposa County, just above mouth of Cotton Creek, and 8 miles upstream from Merced Falls.

DRAINAGE AREA.—1,020 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 28, 1915, to September 30, 1918.

GAGE.—Vertical staff in four sections bolted to solid rock ledge on right bank 250 feet above old dam; read by Trunnel and Stewart.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of boulders, gravel, and solid rock. Control is old concrete dam. Banks high, clean, and not likely to be overflowed. Part of dam was blasted February 1, 1918, to make a fishway.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.5 feet at 4 p. m. March 7, 6 p. m. March 12, and 10 a. m. March 19 (discharge, determined from extension of rating curves, about 17,700 second-feet); minimum stage recorded, 4.3 feet at 7 a. m. September 1 (discharge, 21 second-feet).

1915–1918: Maximum stage recorded, 20.0 feet at 4 p. m. January 17, 1916 (discharge, determined from extension of rating curve, about 22,000 second-feet); minimum stage recorded September 1, 1918.

DIVERSIONS.—None.

REGULATION.—The several small power plants above have little or no storage. The effect of their operation is believed to be slight except during low water.

ACCURACY.—Stage-discharge relation changed February 1, when part of dam was blasted to make a fishway. Rating curves well defined below 12,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for low water, when operation of power plants causes diurnal fluctuation.

Discharge measurements of Merced River at Exchequer, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	J. F. Kunesh	6.08	112	July 24	J. F. Kunesh	6.12	242
23	do	5.90	50.9	25	do	5.65	144
June 19	Charles Leidl	10.99	2,990	Sept. 18	Charles Leidl	5.72	170
20	do	10.52	2,570	19	do	5.72	172

Daily discharge, in second-feet, of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	70	142	110	114	485	2,180	3,000	2,820	1,050	133	36
2	103	77	118	90	118	470	2,180	3,700	3,380	1,470	148	115
3	82	72	118	96	148	441	1,890	3,590	3,820	1,340	165	90
4	86	82	134	118	126	455	1,540	4,430	4,820	1,220	165	98
5	96	77	123	110	133	550	1,340	4,820	4,430	950	148	98
6	99	139	126	103	165	715	1,340	4,300	4,560	805	140	94
7	96	68	90	96	316	11,700	1,340	4,300	4,560	715	148	64
8	86	64	82	78	470	4,060	1,340	3,820	4,820	630	148	86
9	96	94	90	90	267	2,340	1,470	3,000	4,560	550	92	58
10	62	99	96	84	212	1,750	1,820	2,500	4,430	470	100	90
11	67	60	90	126	202	3,940	1,890	2,180	4,820	485	115	76
12	67	129	99	78	183	10,500	2,030	2,180	4,820	485	112	58
13	62	67	99	70	183	5,700	2,030	2,660	4,560	399	104	73
14	78	72	113	129	192	3,000	1,890	3,480	4,690	371	105	66
15	72	78	96	142	234	2,030	1,750	3,590	4,060	330	102	66
16	72	78	90	90	223	1,750	1,750	2,740	3,820	343	98	371
17	67	90	60	118	212	1,470	2,030	2,820	3,000	330	118	245
18	72	103	96	123	304	1,400	2,500	2,660	2,820	291	111	183
19	72	84	72	99	279	13,200	2,660	2,820	2,820	256	111	165
20	72	74	67	96	279	4,060	2,660	3,480	2,820	267	98	148
21	72	90	110	90	715	2,660	3,180	3,590	3,000	245	94	102
22	74	84	94	103	4,300	2,030	3,590	3,590	2,660	245	66	148
23	66	84	70	110	1,470	1,820	3,820	3,820	2,260	223	83	102
24	104	96	74	129	7,360	1,750	3,700	3,590	2,030	202	92	76
25	70	78	72	110	1,890	1,610	3,590	3,590	1,610	212	52	94
26	64	103	103	78	1,000	1,610	3,000	3,380	1,340	202	49	105
27	71	107	113	84	715	3,700	3,000	2,660	1,340	192	53	102
28	77	78	126	103	550	2,340	2,660	2,340	1,280	148	79	165
29	74	82	142	86	.....	1,960	3,000	2,030	1,220	174	54	118
30	78	94	134	78	.....	1,960	3,000	1,890	1,100	165	54	2,660
31	84	.....	99	82	.....	2,030	.....	2,260	.....	183	81	.....

Monthly discharge of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	104	58	77.4	0.076	0.09	4,760
November	139	60	85.8	.084	.09	5,110
December	142	60	101	.099	.11	6,210
January	142	70	100	.098	.11	6,150
February	7,360	114	799	.783	.82	44,400
March	13,200	441	3,020	2.96	3.41	186,000
April	3,820	1,340	2,340	2.29	2.56	139,000
May	4,820	1,890	3,190	3.13	3.61	196,000
June	4,820	1,100	3,280	3.22	3.59	195,000
July	1,470	148	482	.473	.55	29,600
August	165	49	104	.102	.12	6,390
September	2,660	36	198	.194	.22	11,800
The year	13,200	36	1,150	1.13	15.28	830,000

TENAYA CREEK NEAR YOSEMITE, CALIF.

LOCATION.—At Tenaya Bridge, in Yosemite National Park, five-eighths mile below outlet of Mirror Lake, five-eighths mile above junction with Merced River, and 1¼ miles east of Yosemite, Mariposa County.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—July, 1904, to June, 1909; January 5, 1912, to September 30, 1918 (incomplete).

GAGE.—Vertical staff fastened to left abutment of bridge near downstream end; read by an employee of Yosemite National Park. A Friez water-stage recorder was installed at same datum on left bank 50 feet above bridge September 15. Original staff gage fastened to upstream side of bridge 9 feet from left abutment; datum unknown. About December 1, 1912, a new staff gage was installed at new datum on upstream side of bridge near right abutment. This gage was removed and the present staff gage installed February 4, 1913. Present gage datum is 0.55 foot higher than previous datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet June 8 (discharge, 775 second-feet); minimum stage recorded, 0.98 foot September 20 and 21 (discharge, 1.6 second-feet).

1904–1909, 1912–1918: Maximum stage recorded, 8.1 feet.

June 16, 1906 (discharge, 1,280 second-feet); minimum stage recorded, 2.9 feet September 12 and most of October, 1906 (discharge, 0.5 second-foot). Relation between datum of gage of that date and the present datum unknown.

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; not known to have been affected by ice during year. Rating curve well defined between 2 and 1,000 second-feet. Gage read to hundredths twice daily until December 20, twice a week until September 7, then once a day until September 14, when the water-stage recorder was installed. Daily discharge ascertained by applying mean daily gage height to rating table, except September 29, when hourly discharge was averaged; interpolated for days on which gage was not read. Records good.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Tenaya Creek near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	J. F. Kunesh	1.16	2.3	Aug. 29	Charles Leidl	1.11	1.9
Aug. 27	H. D. McGlashan	1.12	2.5	Sept. 15	do	1.00	1.9

Daily discharge, in second-feet, of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	1.7	2.6	4.2	2.5	20	78	450	315	68	5.5	1.8
2	3.0	1.7	2.5	3.8	2.5	22	78	497	368	56	5	1.8
3	2.7	1.7	2.5	3.5	2.5	22	76	543	420	49	4.7	1.8
4	2.5	1.7	2.3	3.1	2.5	22	73	590	435	43	3.8	1.8
5	2.2	1.7	2.3	2.7	2.5	22	70	548	450	37	3.0	1.8
6	2.2	2.2	2.2	2.6	2.5	22	68	505	558	31	2.2	1.8
7	2.2	2.2	2.2	2.6	2.5	26	77	462	667	28	2.2	1.8
8	2.2	2.2	2.2	2.6	2.5	30	86	420	775	25	2.2	1.8
9	2.2	2.2	2.2	2.5	2.5	34	96	339	729	22	2.0	1.8
10	2.2	2.2	2.2	2.5	4.1	36	105	257	682	20	1.9	1.8
11	2.2	2.2	2.3	2.5	5.5	38	110	176	636	19	1.8	1.7
12	2.2	2.2	2.3	2.5	7	39	116	193	590	18	1.8	1.7
13	2.2	2.2	2.3	2.5	9	41	121	211	543	17	1.7	1.7
14	2.2	2.2	2.4	2.5	9	41	135	228	497	14	1.7	1.7
15	2.2	2.2	2.5	2.5	9	41	148	246	450	11	1.7	1.7
16	2.2	2.2	2.7	2.5	9	41	162	264	390	11	1.7	1.7
17	2.2	2.2	2.7	2.5	9	42	176	282	330	10	1.7	1.7
18	2.2	2.2	2.7	2.5	8	43	208	300	288	9	1.7	1.6
19	2.2	2.2	2.7	2.5	8	44	240	308	246	8.5	1.7	1.6
20	2.2	2.2	2.7	2.5	8	45	272	315	226	8	1.7	1.6
21	2.2	2.2	2.7	2.5	9.5	48	259	322	207	7.5	1.7	1.6
22	1.7	2.2	2.7	2.5	11	51	247	330	187	7	1.8	1.6
23	1.7	2.2	2.7	2.5	13	54	234	345	154	6.5	1.8	1.7
24	1.7	2.2	2.7	2.5	14	58	244	360	121	6	1.8	1.7
25	1.7	2.2	4.6	2.5	15	61	253	375	100	5.5	1.8	1.7
26	1.7	2.2	6.5	2.5	16	64	262	343	78	5	1.8	1.7
27	1.7	2.2	6.1	2.5	17	68	272	310	68	4.7	1.9	1.7
28	1.7	2.2	5.7	2.5	19	70	316	278	59	5.5	1.8	1.7
29	1.7	2.2	5.4	2.5	.....	71	361	246	49	6	1.8	35
30	1.7	2.2	5.0	2.5	.....	73	406	269	58	6.5	1.8	27
31	1.7	.....	4.6	2.5	.....	78	.....	292	.....	6	1.8	.....

Monthly discharge of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	3.5	1.7	2.13	0.045	0.05	131
November	2.2	1.7	2.12	.045	.05	126
December	6.5	2.2	3.14	.067	.08	193
January	4.2	2.5	2.66	.057	.07	164
February	19	2.5	7.95	.169	.18	442
March	78	20	44.1	.938	1.08	2,710
April	406	68	178	3.79	4.23	10,600
May	590	176	342	7.28	8.39	21,000
June	775	49	356	7.57	8.45	21,200
July	68	4.7	18.5	.394	.45	1,140
August	5.5	1.7	2.24	.048	.06	138
September	35	1.6	3.67	.078	.09	218
The year	775	1.6	80.2	1.71	23.18	58,000

YOSEMITE CREEK AT YOSEMITE, CALIF.

LOCATION.—At highway bridge in Yosemite National Park, half a mile above junction with Merced River and one-fourth mile northwest of Yosemite, Mariposa County.

DRAINAGE AREA.—43.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1904, to June 1909, and January 4, 1912, to September 30, 1918 (incomplete).

GAGE.—Staff in two sections; upper, vertical, fastened to left abutment near downstream end; lower, inclined, fastened to boulder in front of upper section; read by an employee of Yosemite National Park. Original staff gage was on tree on right bank 50 feet above bridge; January 4, 1912, new staff gage was installed on tree on right bank 25 feet above bridge at approximately same datum. Present gage was installed February 5, 1913, at datum, 3.04 feet higher than that of original gage.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Fine gravel and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at 9 a. m. April 13 (discharge, 979 second-feet); minimum stage recorded, 2.55 feet October 4 to November 5 (discharge, 0.1 second-foot).

1904–1909, 1912–1918: Maximum stage recorded, 10.0 feet at 7.50 p. m. June 8, 1917 (discharge not determined because of backwater); minimum stage, 2.50 feet at 9.15 a. m. September 9, 1915 (no flow).

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 13. Rating curves well defined below 6 second-feet, fairly well defined between 6 and 300 second-feet, and extended above. Gage read to half-tenths twice daily October 1 to December 20 and about twice a week the rest of the year. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage was not read except September 12, 13, 15 and 30, for which discharge was estimated from flow of Merced River. Records fair.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Yosemite Creek at Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 24	J. F. Kunesh	2.53	0.1
Aug. 27	H. D. McGlashan	2.60	.4
Sept. 16	Charles Leidl	2.69	2.8

Daily discharge, in second-feet, of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.1	0.6	0.8	0.5	9	109	280	280	92	1.8	0.6
2	.5	.1	.6	.6	.5	10	121	305	305	78	1.8	.6
3	.3	.1	.5	.4	.5	12	115	330	330	64	1.8	.6
4	.1	.1	.5	.2	.6	15	109	356	305	55	1.8	.6
5	.1	.1	.5	.2	.6	18	103	331	280	46	1.8	.6
6	.1	.1	.5	.2	.6	20	97	306	305	37	1.8	.6
7	.1	.3	.5	.2	.9	18	109	281	330	31	1.8	.6
8	.1	.5	.5	.2	1.3	15	121	256	356	24	1.8	.6
9	.1	.5	.5	.2	1.6	13	133	224	369	18	1.8	.5
10	.1	.5	.5	.2	1.8	14	145	192	382	18	1.8	.5
11	.1	.5	.5	.2	2.1	14	173	159	453	18	1.8	.5
12	.1	.5	.5	.2	2.3	17	201	189	524	16	1.8	.5
13	.1	.5	.5	.2	2.6	20	979	220	519	15	1.8	.5
14	.1	.5	.5	.3	2.6	22	606	250	514	13	1.8	19
15	.1	.5	.5	.4	2.6	25	234	280	509	12	1.8	30
16	.1	.5	.5	.5	2.6	27	206	288	459	10	1.7	2.8
17	.1	.5	.5	.5	2.8	28	177	297	409	8	1.6	2.5
18	.1	.5	.5	.5	2.9	30	183	305	357	7	1.5	2.2
19	.1	.5	.5	.5	3.0	31	189	305	305	7	1.4	1.8
20	.1	.5	.5	.5	3.2	32	195	305	250	7	1.3	1.2
21	.1	.5	.7	.5	3.6	35	195	305	195	6	1.3	.6
22	.1	.5	1.0	.5	4.0	38	195	305	141	6	1.3	.6
23	.1	.5	1.3	.5	4.4	41	195	301	116	5.5	1.2	.6
24	.1	.5	1.5	.5	5.0	44	195	296	92	5	1.1	.6
25	.1	.5	1.8	.5	5.5	46	208	292	78	5	1.0	.6
26	.1	.5	2.1	.5	6.0	49	221	259	64	4.6	.8	.6
27	.1	.5	1.8	.5	7.0	52	234	225	58	4.2	.6	.6
28	.1	.5	1.6	.5	8.0	65	246	192	52	3.8	.7	.6
29	.1	.5	1.4	.5	.....	77	258	159	47	3.4	.8	78
30	.1	.5	1.2	.5	.....	90	270	200	70	3.0	.8	80
31	.1	.....	1.0	.5	.....	97	.....	240	.....	2.4	.6	.....

Monthly discharge of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 43.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.5	0.1	0.13	0.003	0.003	8.0
November	.5	.1	.41	.009	.01	24.4
December	2.1	.5	.83	.019	.02	51.0
January	.8	.2	.40	.009	.01	24.6
February	8.	.5	2.82	.065	.07	157
March	97	9	33	.764	.88	2,030
April	979	97	217	5.02	5.60	12,900
May	356	159	266	6.16	7.09	16,400
June	524	47	282	6.53	7.29	16,800
July	92	2.4	20.2	.468	.54	1,240
August	1.8	.6	1.44	.033	.04	88.5
September	80	.5	7.65	.175	.20	455
The year	979	.1	69.2	1.60	21.75	50,200

SOUTH FORK OF MERCED RIVER AT WAWONA, CALIF.

LOCATION.—In SE. ¼ sec. 33, T. 4 S., R. 21 E., opposite United States military camp in Sierra National Forest, 1 mile below Wawona, Mariposa County. Big Creek enters half a mile above and Rush Creek three-fourths mile below the station.

DRAINAGE AREA.—131 square miles.

RECORDS AVAILABLE.—December 15, 1910, to June 30, 1916; April 13, 1917, to September 30, 1918.

GAGE.—Vertical staff fastened to alder tree on left bank; installed August 22, 1911, 250 feet below site of original gage, which was vertical staff fastened to center pier of footbridge destroyed by high water January 30, 1911. Original datum has not been maintained. Gage read by J. C. Bruce.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year not known; record incomplete; minimum stage recorded, 2.05 feet September 21 (discharge, 12 second-feet).

1910–1918: Maximum stage recorded, 7.2 feet January 26 and February 19 and 20, 1914 (discharge, 3,770 second-feet); minimum stage recorded, 1.4 feet October 17 to November 8, 1915 (discharge, 0.2 second-foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—The ranch of the Wawona Co. is irrigated from a tributary above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 10 and 400 second-feet, well defined between 400 and 2,000 second-feet, and is extended above. Gage read to hundredths at irregular intervals. Daily discharge ascertained by applying gage height to rating table. Records good for low and medium and fair for high stages.

Discharge measurements of South Fork of Merced River near Wawona, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 29	J. F. Kunesh	2.08	13
Aug. 28	H. D. McGlashan	2.03	13

Daily discharge, in second-feet, of South Fork of Merced River at Wawona, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	14	a20	a15	17	60	a400	875	770	a350	a21	a15
2	14	14	a21	15	15	56	a330	990	a850	545	a21	a15
3	14	a14	21	15	10	80	285	a1,180	1,030	204	21	a15
4	a14	14	21	15	11	92	285	a1,400	1,500	a420	19	a15
5	a13	14	19	15	15	a120	298	a1,550	a1,400	a280	18	a15
6	13	a14	16	15	27	150	308	a1,380	a1,300	104	a17	a15
7	13	a14	16	a15	60	912	330	990	1,170	60	a16	a15
8	13	a15	a16	a15	a46	308	355	a900	a1,070	76	15	a15
9	13	15	16	a16	31	150	a390	670	950	104	15	a15
10	13	15	15	a16	a28	a260	430	545	a1,200	a90	a15	a15
11	a13	15	15	a16	25	380	458	a400	a1,150	a75	a15	a15
12	a14	16	15	a17	26	a300	515	515	1,110	a60	a14	a15
13	a14	a16	15	a17	a27	224	485	805	735	45	a14	a40
14	14	15	15	a17	29	a200	405	950	a640	a45	14	80
15	14	a15	a15	a18	33	a180	390	a1,150	a550	a45	14	28
16	a14	a14	a15	a18	30	166	a530	a900	485	a45	15	a23
17	14	14	a15	18	31	a180	a725	a880	a450	45	14	a18
18	14	15	a15	18	33	a200	990	a860	a420	a39	a14	13
19	a14	16	15	18	a38	a230	702	840	390	33	a14	a13
20	14	a16	15	17	43	264	770	1,190	a370	a32	a14	a12
21	14	15	15	a17	52	216	735	a1,200	a340	a32	14	12
22	14	a16	a15	a17	a72	a225	a900	840	308	31	14	17
23	a14	a16	a15	a17	92	240	990	a1,140	281	28	a14	a16
24	14	a17	a15	a17	a92	a250	990	a1,100	a255	a28	14	a16
25	14	a17	a15	a17	92	a250	a880	840	a245	28	a14	15
26	a14	a18	a15	a17	92	a240	735	805	a230	a26	a13	a17
27	a14	a18	a15	a17	70	a250	638	a620	204	23	a12	a19
28	14	a19	a15	a17	68	a280	a690	430	a180	a23	12	21
29	14	a19	a15	17	.....	a310	740	a370	121	a22	a13	735
30	14	a20	a15	17	.....	a350	a800	a330	a200	a21	a14	605
31	14	.....	a15	17	.....	a400	.....	605	.....	21	15	.....

a Gage not read; discharge estimated from record of flow of Merced River at Happy Isles and Exchequer.

NOTE.—Apr. 29, May 4, 7, and 19, recorded gage heights do not represent the mean for the day; discharge estimated from record of flow of Merced River at Exchequer.

Monthly discharge of South Fork of Merced River at Wawona, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	14	13	13.8	0.105	0.12	849
November	20	14	15.7	.120	.13	934
December	21	15	16.0	.122	.14	984
January	18	15	16.5	.126	.15	1,010
February	92	10	43.0	.328	.34	2,390
March	912	56	243	1.85	2.13	14,900
April	990	285	583	4.45	4.97	34,700
May	a1,550	330	876	6.69	7.71	53,900
June	a1,500	121	663	5.06	5.64	39,500
July	545	21	96.1	.734	.85	5,910
August	21	12	15.1	.115	.13	928
September	735	12	62.7	.479	.53	3,730
The year	a1,550	10	221	1.69	22.84	160,000

a Estimated.

TUOLUMNE RIVER AND TRIBUTARIES.

TUOLUMNE RIVER BELOW HETCH HETCHY DAM SITE, NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ SE. ¼ sec. 17, T. 1 N., R. 20 E., in Yosemite National Park, three-fourths mile below Hetch Hetchy dam site and 11 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1914, to September 30, 1918. This station was established to take the place of the station at the dam site when it became necessary to discontinue that station on account of construction.

GAGE.—Gurley printing water-stage recorder on left bank. Difference in elevation between the zero of this gage and that of the gage at the dam site is 53.15 feet.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Boulders and solid rock; permanent. Bed at measuring section was smoothed off by removing some boulders. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.9 feet at 3 a. m. June 14 (discharge, 8,500 second-feet); minimum stage from water-stage recorder, 0.88 foot at 7 a. m. January 27 (discharge, 4.1 second-feet).

1915–1918: Maximum stage from water-stage recorder, 13.8 feet at 4 a. m. June 10, 1917 (discharge, 10,000 second-feet); minimum stage from water-stage recorder, 0.88 foot at 7 a. m. January 27, 1918 (discharge, 4.1 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curves well defined. Daily discharge ascertained by applying to rating table mean daily gage height determined by averaging readings printed every 15 minutes, except January 27, February 6, March 10, September 14 and 29, when mean hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 17	1.36	22	June 12	11.88	6,420	July 11	4.65	412
Mar. 22	5.83	670	24	8.66	2,110	12	4.43	364
Apr. 12	7.24	1,240	July 1	7.20	1,210	22	3.38	200
28	8.26	1,790	5	6.54	960	Aug. 6	2.56	118
May 19	8.70	2,110	6	6.20	810	14	2.14	64
June 7	11.72	6,050	7	5.75	653	24	1.80	46

Daily discharge, in second-feet, of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	14	22	30	14	264	1,280	2,170	2,970	1,130	132	75
2	40	14	26	30	17	337	1,200	2,560	3,780	1,180	146	72
3	39	13	28	30	18	391	825	2,560	4,340	1,300	132	60
4	37	12	24	29	16	400	670	3,190	4,480	1,070	138	52
5	34	12	22	28	16	355	628	3,420	5,120	878	124	49
6	31	17	24	27	70	364	670	3,190	5,460	775	109	47
7	30	20	24	27	280	790	685	2,970	5,640	640	93	46
8	29	22	22	28	123	530	808	2,560	6,200	552	82	45
9	28	22	20	28	97	410	1,010	1,940	5,820	510	78	45
10	28	23	19	22	92	601	1,130	1,540	6,200	470	74	42
11	27	22	19	20	93	950	1,200	1,280	7,000	420	74	37
12	26	22	18	22	94	700	1,280	1,390	7,200	373	76	34
13	26	23	18	26	114	552	1,160	2,020	7,000	337	74	36
14	26	26	18	28	107	520	912	2,760	7,200	320	81	154
15	25	22	18	32	94	540	912	2,560	6,400	304	116	264
16	24	19	18	33	84	578	970	1,910	5,120	280	95	156
17	24	17	16	37	99	565	1,180	2,050	4,060	264	78	112
18	24	17	18	46	105	685	1,360	1,840	4,060	250	68	89
19	23	16	18	43	105	842	1,280	2,130	4,340	229	60	73
20	22	16	20	31	113	640	1,480	2,760	4,200	222	56	64
21	21	16	20	30	140	670	1,770	2,970	3,660	215	54	58
22	20	16	18	26	201	700	2,130	3,190	3,300	201	52	56
23	19	17	15	28	188	715	2,250	3,300	2,660	188	49	78
24	18	15	14	27	257	790	2,250	3,190	2,210	170	49	78
25	17	16	16	25	194	860	2,170	3,080	1,800	158	50	62
26	16	18	28	22	222	895	2,020	2,660	1,700	140	52	54
27	16	18	47	17	243	912	1,880	2,020	1,600	131	53	48
28	16	16	44	18	236	790	1,770	1,570	1,480	130	55	46
29	15	12	37	22	.....	808	1,980	1,300	1,300	130	56	1,100
30	14	14	34	20	.....	912	2,090	1,360	1,160	126	66	990
31	14	.....	32	16	.....	1,070	.....	1,980	.....	122	70	.....

Monthly discharge of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	40	14	24.6	1,510
November	26	12	17.6	1,050
December	47	14	23.1	1,420
January	46	16	27.4	1,680
February	280	14	123	6,830
March	1,070	264	650	40,000
April	2,250	628	1,360	80,900
May	3,420	1,280	2,370	146,000
June	7,200	1,160	4,250	253,000
July	1,180	122	426	26,200
August	146	49	80.4	4,940
September	1,100	34	137	8,150
The year	7,200	12	789	572,000

TUOLUMNE RIVER NEAR BUCK MEADOWS,[1] CALIF.

LOCATION.—In SW. ¼ sec. 24, T. 1 S., R. 17 E., 1 mile below junction with South Fork of Tuolumne River and 2 miles north of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 2, 1907, to September 30, 1918 (not complete).

GAGE.—Gurley printing water-stage recorder on left bank, installed January 2, 1913. Prior to January 2, 1913, station was maintained by the Yosemite Power Co. in the pool above, the gage consisting of a vertical staff on the left bank at site of United States Geological Survey's present cable. The Survey began reading the gage November 17, 1913, and developed a curve of relation.

DISCHARGE MEASUREMENTS.—Made from cable one-third mile above gage.

CHANNEL AND CONTROL.—Boulders and solid rock; probably permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.19 feet at 5 a. m. June 14 (discharge, 12,600 second-feet); minimum stage from water-stage recorder, 0.47 foot from 2 to 10 a. m. November 3 (discharge, 29 second-feet).

1907–1918: Maximum stage recorded, 14.00 feet January 14, 1909 (discharge, 27,200 second-feet); minimum stage recorded, 0.47 foot from 2 to 10 a. m. November 3, 1917 (discharge, 29 second-feet).

DIVERSIONS.—A small quantity of water is diverted from South Fork of Tuolumne River at Harden ranch, 7 miles above the mouth, and is used in vicinity of Groveland.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily height determined by averaging gage heights recorded every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table, except December 1, 26, 27, February 6, September 14 and 29, when hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 18	0.69	46	Feb. 25	3.26	603	May 30	5.86	2,570
Nov. 5	.48	30	Mar. 8	4.81	1,600	June 15	9.29	9,180
20	.60	38	27	6.00	2,770			
30	.57	34	Apr. 23	7.72	5,590			

[1] Formerly published as "near Groveland."

Daily discharge, in second-feet, of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	30	61	110	73	645	3,270	5,010	5,190	1,460	158	107
2	50	30	208	105	77	735	3,480	5,550	6,570	1,710	182	111
3	53	30	147	100	72	835	2,520	5,550	7,350	1,840	188	106
4	55	30	110	95	74	920	2,040	6,570	7,990	1,580	163	91
5	52	30	91	90	72	920	1,840	7,010	8,530	1,270	165	82
6	49	39	83	86	190	1,120	1,890	6,570	8,810	1,050	149	75
7	46	40	82	86	1,050	3,340	1,940	6,350	9,110	890	134	74
8	44	42	72	94	580	1,840	2,140	5,750	9,410	760	121	74
9	42	52	65	107	450	1,270	2,580	4,490	9,110	668	113	73
10	40	48	65	91	417	1,420	3,270	3,480	9,410	622	108	66
11	39	45	65	78	396	3,480	3,340	2,870	10,400	560	102	61
12	38	44	62	81	384	3,410	3,550	2,990	10,700	499	104	60
13	38	46	59	97	405	2,240	3,340	3,930	10,400	457	106	63
14	37	57	57	109	414	1,760	2,930	5,370	10,700	432	103	423
15	37	58	51	132	370	1,660	3,040	5,370	9,410	408	116	454
16	37	52	49	129	337	1,620	3,160	4,010	7,990	382	144	296
17	38	45	50	144	382	1,620	3,270	4,250	6,350	359	126	200
18	44	41	50	156	376	1,990	3,620	3,850	6,150	334	110	151
19	39	39	48	169	368	3,850	3,550	4,250	6,350	313	99	121
20	37	38	50	142	379	2,360	3,850	5,190	6,150	294	90	114
21	37	37	54	111	506	2,090	4,330	5,550	5,370	286	84	107
22	35	37	56	106	982	2,040	5,190	5,750	4,830	267	81	116
23	34	36	53	99	785	1,990	5,370	6,150	4,250	251	80	167
24	33	36	52	99	1,380	2,140	5,370	5,950	3,480	236	76	138
25	33	36	52	97	690	2,360	5,190	5,750	2,750	218	75	130
26	32	36	98	94	690	2,630	4,650	5,010	2,360	200	75	117
27	32	37	384	84	690	3,130	4,650	4,010	2,190	182	77	102
28	31	37	216	80	668	2,410	4,250	3,130	2,040	172	78	103
29	31	37	150	83	.....	2,300	4,650	2,630	1,800	169	80	754
30	31	36	140	80	.....	2,460	4,830	2,750	1,540	165	88	1,540
31	31	.....	120	77	.....	2,870	.....	3,770	.....	160	100	.....

NOTE.—No gage-height record Dec. 29 to Jan. 5; discharge estimated from flow at other stations in the drainage basin; Apr. 15 and 16, discharge interpolated.

Monthly discharge of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	55	31	39.5	2,430
November	58	30	40.0	2,380
December	384	48	93.5	5,750
January	169	77	104	6,390
February	1,380	72	473	26,300
March	3,850	645	2,050	126,000
April	5,370	1,840	3,570	212,000
May	7,010	2,630	4,800	295,000
June	10,700	1,540	6,550	390,000
July	1,840	160	587	36,100
August	188	75	112	6,890
September	1,540	60	203	12,100
The year	10,700	30	1,550	1,120,000

TUOLUMNE RIVER ABOVE LA GRANGE DAM, NEAR LA GRANGE, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 3 S., R. 14 E., 3½ miles above La Grange dam and 5 miles above La Grange, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 19, 1915, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock and boulders. Banks are high, one channel at all stages. Control is solid rock dike which extends entirely across the stream and over which at low water there is a drop of about 5 feet. Point of zero flow, gage height 0.06 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 22.47 feet at 6.30 p. m. March 7 (discharge, determined from extension of rating curve, 23,300 second-feet); minimum stage recorded, 1.06 feet from noon October 30 to 3 a. m., October 31, and 11 a. m. November 4 to 4 p. m. November 5 (discharge, 5 second-feet).

1916–1918: Maximum stage recorded, 27.58 feet at 5.15 p. m. February 21, 1917 (discharge, 36,500 second-feet); minimum stage recorded October 30, 31, November 4 and 5, 1917.

DIVERSIONS.—Sierra and San Francisco Power Co.'s canal heads 9½ miles above and returns its water about one-half mile above the bridge at La Grange. There is also a small diversion from South Fork of Tuolumne River at Harden ranch for irrigation in vicinity of Groveland.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Mean daily gage height determined by averaging gage heights printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table, except March 7, 8, September 15 and 30, when hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River above La Grange dam, near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	Charles Leidl	1.41	14	July 29	J. F. Kunesh	2.81	136
31	C. J. Emerson	1.09	6.9	Aug. 29	Charles Leidl	2.16	62

Daily discharge, in second-feet, of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30. 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	7	45	156	91	912	4,550	5,980	5,300	1,380	132	42
2	22	7	192	142	81	972	4,910	6,680	6,820	1,600	127	57
3	21	6	298	164	86	1,060	4,000	6,680	7,710	1,780	163	61
4	21	5	204	145	83	1,120	3,240	7,410	8,310	1,720	150	60
5	22	5.5	152	122	81	1,190	2,790	8,310	8,910	1,330	131	46
6	21	13	129	115	103	1,240	2,700	7,860	9,210	1,100	131	53
7	19	42	114	110	678	13,700	2,700	7,710	9,510	972	113	29
8	16	46	108	107	1,040	5,880	2,970	6,820	9,810	816	100	29
9	15	48	97	112	631	2,790	3,330	6,120	9,660	710	106	28
10	24	39	88	125	530	2,280	4,440	4,550	9,510	646	75	31
11	22	42	84	109	478	5,040	4,550	3,700	10,300	572	65	38
12	10	72	84	100	465	15,100	4,790	3,420	10,900	517	61	23
13	8.5	95	80	132	452	7,710	4,670	4,440	10,700	465	62	34
14	7.5	109	74	152	504	4,000	3,900	5,840	10,900	428	86	60
15	7	92	68	238	544	3,060	3,510	6,260	9,960	404	63	502
16	6.5	82	66	185	440	2,700	3,510	4,910	8,760	404	72	428
17	7	60	64	166	530	2,520	3,900	4,790	7,260	349	113	278
18	9	48	64	179	678	2,520	4,670	4,550	6,680	328	97	184
19	12	43	68	188	517	11,200	4,790	4,670	6,820	308	78	134
20	16	38	61	196	504	5,980	4,910	5,560	6,540	288	64	102
21	14	36	56	164	727	4,000	5,430	6,260	5,980	269	72	89
22	12	34	58	139	3,900	3,510	6,260	6,540	5,170	255	42	83
23	10	31	61	131	1,720	3,240	6,820	6,820	4,550	235	38	90
24	9	30	61	122	5,560	3,240	6,820	6,680	3,700	222	34	148
25	8.5	28	62	121	2,060	3,330	6,540	6,540	2,970	204	32	134
26	7	28	74	118	1,190	3,510	5,980	5,840	2,440	195	27	112
27	6	30	231	113	1,080	5,700	5,980	4,670	2,200	174	25	96
28	6	30	338	98	972	4,110	5,430	3,700	2,060	156	25	96
29	5.5	31	255	91	.....	3,600	5,560	3,060	1,780	145	26	98
30	5	31	204	114	.....	3,600	5,840	3,060	1,600	163	26	1,380
31	6	.....	177	104	.....	4,000	.....	3,800	.....	135	31	.....

Monthly discharge of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	5	12.9	793
November	109	5	40.3	2,400
December	338	45	120	7,380
January	238	91	137	8,420
February	5,560	81	919	51,000
March	13,700	912	4,280	263,000
April	6,820	2,700	4,650	277,000
May	8,310	3,060	5,590	344,000
June	10,900	1,600	6,870	409,000
July	1,780	135	589	36,200
August	163	25	76.4	4,690
September	1,380	23	152	9,040
The year	13,700	5	1,950	1,410,000

Combined daily discharge, in second-feet, of Tuolumne River above La Grange dam near La Grange, Calif., and Sierra & San Francisco Power Co.'s canal, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	68	109	217	152	976	4,610	6,040	5,370	1,450	196	106
2	83	68	253	203	145	1,040	4,970	6,740	6,890	1,670	191	121
3	82	67	359	225	150	1,120	4,060	6,740	7,780	1,850	227	125
4	82	66	265	206	147	1,180	3,300	7,470	8,350	1,790	214	124
5	83	66	213	183	145	1,250	2,850	8,370	8,980	1,400	195	110
6	82	74	190	176	167	1,300	2,760	7,920	9,280	1,170	195	111
7	80	103	175	171	742	13,700	2,760	7,720	9,580	1,040	171	93
8	77	107	169	168	1,100	5,900	3,030	6,860	9,870	884	164	93
9	76	109	158	173	695	2,850	3,390	6,190	9,730	774	170	92
10	79	100	149	186	594	2,340	4,480	4,610	9,580	714	139	95
11	73	103	145	170	542	5,100	4,610	3,770	10,400	640	129	102
12	71	133	145	161	529	15,200	4,850	3,490	11,000	581	125	87
13	70	136	141	193	516	7,760	4,730	4,510	10,800	529	126	98
14	68	170	135	213	568	4,060	3,960	5,880	11,000	492	128	124
15	68	153	129	299	608	3,120	3,570	6,300	10,000	468	127	566
16	68	143	127	246	504	2,760	3,570	4,980	8,830	468	136	492
17	68	121	125	227	594	2,560	3,960	4,860	7,330	413	177	321
18	70	109	125	240	742	2,580	4,730	4,590	6,750	392	161	248
19	73	84	129	249	581	11,200	4,850	4,740	6,890	372	142	198
20	77	99	122	257	568	6,040	4,970	5,630	6,610	352	128	166
21	75	97	117	225	791	4,060	5,490	6,330	6,050	333	115	153
22	73	95	119	200	3,960	3,570	6,300	6,580	5,240	319	108	147
23	71	92	122	192	1,780	3,300	6,880	6,860	4,620	299	102	154
24	70	91	122	183	5,620	3,300	6,880	6,750	3,770	286	98	212
25	70	69	123	182	1,120	3,390	6,600	6,610	3,040	268	96	177
26	48	89	135	179	1,250	3,570	6,040	5,910	2,510	259	91	176
27	67	91	292	174	1,140	5,760	6,040	4,740	2,270	238	89	160
28	67	91	399	159	1,040	4,170	5,490	3,740	2,130	220	89	160
29	66	92	316	152	.....	3,660	5,620	3,130	1,850	209	90	162
30	66	92	265	175	.....	3,660	5,900	3,130	1,670	227	90	1,440
31	67	.....	238	165	.....	4,060	.....	3,870	.....	199	95	.....

Combined monthly discharge of Tuolumne River, above La Grange dam near La Grange, Calif., and Sierra & San Francisco Power Co.'s canal, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	85	48	72.7	4,470
November	170	66	99.3	5,910
December	399	109	181	11,100
January	257	152	198	12,200
February	5,620	145	982	54,500
March	15,200	976	4,340	267,000
April	6,880	2,760	4,710	280,000
May	8,370	3,130	5,650	347,000
June	11,000	1,670	6,940	413,000
July	1,850	199	655	40,300
August	227	89	139	8,550
September	1,440	87	214	12,700
The year	15,200	48	2,010	1,460,000

NOTE.—See page 156 for record of flow of Sierra & San Francisco Power Co.'s canal.

FALLS CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 1 N., R. 20 E., in Yosemite National Park, 300 feet above branch to Tueenlala Falls, one-fourth mile above Wapama Falls, and 13 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 22, 1915, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of broken boulders; rough; straight above and below station. Banks not subject to overflow. Control is ledge of rock 75 feet below gage. Point of zero flow, gage-height 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.34 feet at 9 a. m. June 14 (discharge, 1,070 second-feet); minimum stage, from water-stage recorder, 0.71 foot November 4 and 5 (discharge 0.5 second-foot).

1916–1918: Maximum stage, from water-stage recorder, 5.6 feet at 8 a. m. June 10, 1917 (discharge, 1,200 second-feet); minimum stage, from water-stage recorder 0.71 foot November 4 and 5, 1917 (discharge, 0.5 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 10 second-feet, and fairly well defined below. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except December 1, February 6, March 10, and September 29, when hourly discharge was averaged. Records excellent except those for extreme low water, which are considered good.

Discharge measurements of Falls Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 2	1.00	1.2	Apr. 27	3.61	375
Apr. 13	3.11	214	Aug. 20	1.15	2.3

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Daily discharge, in second-feet, of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.6	0.6	3.0	5.0	3.0	49	224	420	565	115	9.0	3.5
2	1.6	.6	6.5	5.0	2.7	59	193	457	660	138	8.0	3.1
3	1.6	.6	4.8	4.8	2.6	68	148	443	690	157	8.0	2.9
4	1.6	.5	4.5	4.7	2.6	67	119	530	715	123	7.0	2.6
5	1.5	.5	4.6	4.4	2.7	57	114	587	745	88	6.5	2.4
6	1.4	.6	4.2	4.1	71	52	123	530	770	74	6.5	2.2
7	1.4	.8	3.7	4.1	71	97	138	530	766	63	5.5	2.1
8	1.2	1.0	3.2	4.7	38	63	162	450	810	52	4.8	2.0
9	1.2	.8	2.9	4.7	31	55	206	315	788	45	4.2	1.9
10	1.1	.8	2.6	4.8	29	98	236	230	788	39	4.0	1.9
11	1.1	.9	2.6	2.5	31	134	241	183	854	35	3.8	2.0
12	1.0	1.2	2.4	3.2	33	78	250	188	854	32	3.6	2.0
13	1.0	1.9	2.3	4.8	35	64	222	286	877	29	3.7	2.5
14	1.0	1.5	2.2	7	31	64	173	416	924	27	3.6	12
15	1.0	1.4	2.1	7	31	72	171	416	788	25	3.5	23
16	1.0	1.5	2.0	8	29	82	193	286	704	23	3.3	19
17	1.0	1.5	2.0	11	33	82	238	300	568	22	3.3	13
18	1.0	1.4	2.0	12	32	93	266	266	530	21	3.2	9.5
19	.9	1.4	2.0	10	32	83	261	309	457	20	3.0	7.5
20	.9	1.4	2.0	8	34	74	289	404	426	19	2.7	6
21	.9	1.4	2.0	5.5	33	95	336	446	362	18	2.6	5.5
22	.8	1.2	2.2	5	36	108	388	494	330	17	2.4	5
23	.8	1.2	2.2	4.2	34	121	413	512	315	16	2.2	5
24	.7	1.2	2.2	3.9	38	138	416	477	258	15	2.1	5
25	.7	1.2	2.5	3.9	38	153	400	460	206	14	1.9	4.6
26	.7	1.2	15	4.0	41	142	388	420	180	13	1.8	4.1
27	.7	1.2	14	3.7	47	123	378	315	173	12	1.7	3.7
28	.6	1.2	9.5	3.5	45	114	352	235	153	11	1.7	3.7
29	.6	1.2	8	3.2	.....	134	372	231	129	11	1.7	38
30	.6	1.2	7	3.1	.....	162	400	315	110	10	2.5	108
31	.6	.....	6	3.2	.....	190	.....	460	.....	10	3.5	.....

NOTE.—No gage-height record May 28 to June 6 and July 12 to Aug. 5; discharge estimated from flow of Cherry Creek and Tuolumne River below Hetch Hetchy dam site.

Monthly discharge of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.6	0.6	1.03	63.3
November	1.9	.5	1.10	65.5
December	15	2.0	4.26	262
January	12	2.5	5.26	323
February	71	2.6	31.7	1,760
March	190	49	95.8	5,890
April	416	114	260	15,500
May	587	183	384	23,600
June	924	110	550	32,700
July	157	10	41.7	2,560
August	9	1.7	3.91	240
September	108	1.9	10.1	601
The year	924	.5	143	83,600

CHERRY CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 28, T. 2 N., R. 19 E., in Stanislaus National Forest, at abandoned sawmill camp 3 miles by trail from Lake Eleanor and 13 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—114 square miles [1] (above dam site in sec. 5, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on right bank 800 feet above site of old suspension bridge. Original gage was a Lietz graph water-stage recorder at the bridge. It was moved upstream to present site (new datum) October 22, 1913; and replaced by the present gage (same datum) November 30, 1914.

DISCHARGE MEASUREMENTS.—Made from cable 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of fine gravel and sand which shifts slightly. Control is a solid rock dike except at right bank, where it is gravel and small boulders. Channel is straight above and curved to right below. Left bank is high; right bank fairly high and probably not subject to overflow. Zero flow, gage height, 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.20 feet at 11 p. m. June 13 (discharge determined from extension of rating curve, 2,740 second-feet); minimum stage from water-stage recorder, 0.72 foot from 4 a. m. November 2 to 10 p. m. November 10 (discharge, 0.5 second-foot).

1910–1918: Maximum mean daily discharge, 7,000 second-feet January 31, 1911 (maximum stage unknown); minimum stage, dry September 6 to 12, 1910.

ICE.—Stream freezes over at gage but not at control. Stage-discharge relation probably not affected by ice.

DIVERSIONS.—None.

REGULATION.—None before June 22. Complete regulation by Eleanor dam after June 22.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 10 and 3,000 second-feet. Operation of water-stage recorder satisfactory throughout the year except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by averaging the readings printed every 15 minutes by the water-stage recorder, except November 6, 7, 12, December 1, 25, 26, 27, February 6, March 10, September 13, 14, 22, and 28–30, when hourly discharge was averaged. Records excellent, except those for extreme low water, which are considered good.

Discharge measurements of Cherry Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 11	0.94	1.9	Apr. 15	3.33	490	June 20	4.40	913
Jan. 1	1.58	32	May 18	4.06	756	July 20	1.58	32
Apr. 5	2.88	308	June 5	5.53	1,540	Aug. 20	.88	1.3

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Daily discharge, in second-feet, of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	0.9	0.5	33	29	13	158	692	1,300	1,330	245	12	3.9
2	.9	.5	53	26	13	191	612	1,430	1,560	373	10	2.3
3	.9	.5	44	24	12	210	444	1,400	1,620	451	9.0	1.7
4	.8	.5	35	21	12	207	384	1,650	1,680	312	8.0	1.5
5	.8	.5	32	19	12	158	373	1,830	1,750	223	6.5	1.2
6	.8	4.0	30	20	375	156	387	1,660	1,820	170	6.0	1.0
7	.8	18	23	26	344	340	440	1,660	1,820	136	5.5	1.0
8	.7	6	18	39	122	173	493	1,400	1,960	114	4.7	1.0
9	.7	3.3	20	25	114	153	672	985	1,820	94	4.2	.9
10	.7	2.6	20	16	114	333	712	720	1,820	85	3.7	.8
11	.7	2.3	17	14	110	528	712	570	2,020	75	3.3	.8
12	.6	9.5	14	18	110	316	755	585	2,100	67	2.9	.8
13	.6	21	11	27	117	229	652	895	2,100	60	2.6	25
14	.6	8.5	9.5	50	94	207	536	1,300	2,100	55	2.3	496
15	.6	4.7	10	47	85	232	572	1,300	1,620	49	2.2	67
16	.5	3.3	8.0	55	84	255	605	900	1,500	45	2.0	29
17	.5	2.4	7.0	67	84	255	745	940	1,250	42	1.9	19
18	.5	2.2	8.5	72	87	391	830	845	1,120	37	1.8	14
19	.5	1.9	13	51	84	299	815	1,020	1,000	34	1.7	12
20	.5	1.8	14	30	78	248	905	1,150	958	31	1.7	10
21	.5	1.7	14	26	85	289	1,050	1,200	778	28	1.6	8.5
22	.5	1.6	12	22	96	312	1,210	1,280	734	26	1.5	88
23	.5	1.6	9.0	23	94	330	1,290	1,300	712	24	1.4	34
24	.5	1.6	7.0	22	92	387	1,300	1,220	592	22	1.3	22
25	.5	1.5	9.0	24	102	432	1,250	1,150	482	20	1.2	17
26	.5	1.4	277	20	129	447	1,200	958	421	19	1.0	14
27	.5	1.4	162	17	147	362	1,200	734	394	18	1.0	10
28	.6	1.3	85	17	144	337	1,100	552	337	16	.9	29
29	.7	1.1	62	16	.....	406	1,160	544	282	15	.9	387
30	.7	1.1	44	16	.....	493	1,250	734	242	14	1.0	198
31	.8	.....	33	14	.....	592	.....	1,080	.....	12	12	.....

NOTE.—No gage-height record Oct. 4–15, and Apr. 16 to May 17; discharge estimated from flow of Falls Creek and Tuolumne River.

Monthly discharge of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.9	0.5	0.64	39.4
November	21	.5	3.61	215
December	277	7	36.6	2,250
January	72	14	28.8	1,770
February	375	12	105	5,830
March	592	153	304	18,700
April	1,300	373	812	48,300
May	1,830	544	1,110	68,300
June	2,100	242	1,260	75,000
July	451	12	93.9	5,770
August	12	.9	3.74	230
September	496	.8	49.9	2,970
The year	2,100	.5	317	229,000

ELEANOR CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 1 N., R. 19 E., in Yosemite National Park, one-third mile below Lake Eleanor dam site, 1½ miles below Lake Eleanor, and 11 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—79 square miles[1] (above dam site in sec. 3, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—November 20, 1909, to September 30, 1918.

GAGE.—Lietz water-stage recorder in wooden house on reinforced concrete well on right bank. Previous to November 13, 1915, recorder was one mile upstream on right bank. Short distance upstream from that site was a vertical staff in two sections which was probably the original gage.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of small boulders. Control of large boulders, ledge, and concrete wall for low water. Channel straight above and below. Banks not subject to overflow. Zero flow, gage height 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.23 feet at 8 a. m. May 5 (discharge, 952 second-feet); minimum stage, from water-stage recorder, 1.00 foot September 15–18 (discharge, 0.1 second-foot).

1910–1918: Maximum stage recorded, 13.1 feet January 30, 1911 (discharge, 5,000 second-feet); minimum stage, dry September 8 to 14, 1910.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except February 6, August 2, September 8, 9, 14, 20–24, and 29, when discharge for two-hour periods was averaged. Records excellent.

Discharge measurements of Eleanor Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 9	1.05	0.2	Apr. 14	4.43	564
Apr. 4	4.00	397	June 22	3.65	277

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Daily discharge, in second-feet, of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.4	0.1	0.1	20	16	120	585	770	370	0.5	12	18
2	.4	.1	.1	20	15	125	630	795	458	.3	11	18
3	.3	.1	.2	20	15	136	505	770	517	.2	6.0	18
4	.3	.1	1.2	18	14	150	412	845	553	.2	6.0	18
5	.2	.1	1.2	18	14	158	348	925	581	.2	3.5	18
6	.2	.2	1.2	18	24	163	339	845	585	.2	6.0	18
7	.2	.2	2.1	16	131	221	351	820	608	.2	9.0	18
8	.2	.2	2.1	16	165	244	392	770	608	.2	7.5	12
9	.2	.2	2.1	16	158	207	465	698	608	.2	4.7	11
10	.2	.2	2.1	14	147	196	652	545	585	.2	9.5	10
11	.2	.1	2.3	14	134	364	675	440	608	.2	11	12
12	.2	.1	2.5	14	126	423	698	402	630	.2	11	12
13	.2	.1	2.5	15	123	360	675	458	630	.2	11	11
14	.2	.1	2.7	16	120	300	553	561	630	.2	11	4.3
15	.2	.1	2.7	16	113	267	497	608	581	.2	11	.1
16	.2	.1	2.5	16	105	252	497	521	509	.2	12	.1
17	.2	.1	2.5	17	105	249	565	473	477	.2	13	.1
18	.2	.1	2.5	18	102	276	652	465	423	.2	13	5.5
19	.2	.1	2.5	19	97	351	698	465	381	.2	13	9.5
20	.2	.1	2.5	20	96	324	720	513	354	.2	13	16
21	.2	.1	2.1	21	101	306	770	541	327	.2	13	19
22	.2	.1	2.5	22	111	309	845	561	285	.2	14	7.5
23	.1	.1	2.5	21	115	315	925	581	158	.2	15	2.4
24	.1	.1	2.7	21	131	339	870	573	64	.2	15	13
25	.1	.1	3.3	20	128	381	820	549	59	.2	15	19
26	.1	.1	6.0	20	123	430	745	521	3.1	.2	15	22
27	.1	.1	11	18	123	454	770	454	2.1	.2	15	23
28	.1	.1	16	18	120	402	698	388	1.2	.2	15	34
29	.1	.1	19	18	.....	378	698	324	.8	.2	19	18
30	.1	.1	20	17	.....	423	745	294	.6	.2	18	.4
31	.1	.....	20	16	.....	493	.....	309	.....	.2	18	.....

Monthly discharge of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.4	0.1	0.19	11.7
November	.2	.1	.12	7.1
December	20	.1	4.60	283
January	22	14	17.8	1,090
February	165	14	99.0	5,500
March	493	120	294	18,100
April	925	339	626	37,200
May	925	294	574	35,300
June	630	.6	387	23,000
July	.5	.2	.21	12.9
August	19	3.5	11.8	726
September	34	.1	12.9	768
The year	925	.1	169	122,000

EVAPORATION FROM LAKE ELEANOR NEAR SEQUOIA, CALIF.

LOCATION.—In sec. 35, T. 2 N., R. 19 E., in Yosemite National Park, about 12 miles north of Sequoia, Tuolumne County.

RECORDS AVAILABLE.—February 27, 1915, to September 30, 1918.

EQUIPMENT.—Evaporation pan is 48 inches in diameter, 10 inches deep, hung by four turnbuckles in a raft of cedar logs. Raft is anchored about 1,000 feet from the nearest shore. A temporary pan was used from March 19 to July 3.

METHOD.—Observations made several times a week by an engineer who measures the quantity of water he adds to or takes out of the pan in order to bring the water surface in the pan to the point of a metal cone set at its center. The water added or taken out is measured in a small can, the cubical content of which is known. Number of cans is reduced to depth in inches and that, corrected by the amount of precipitation, gives amount of evaporation.

ELEVATION.—About 4,700 feet above sea level.

Total evaporation, in inches, since last day recorded, of Lake Eleanor near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	(a)							0.6			0.5	
2	0.26	0.38		0.12	0.14		0.2		0.6		.5	0.5
3			0.01					.5		b 1.2		
4				.12	.10		.3		.6		.5	.6
5	.56	.05	.20		.06			.6	.3			
6				.08			.3				.5	.5
7			.28		(a)			.6				
8	.02	.34		.08			.4			1.3	.7	.8
9			.20		.14		.2	.0				
10	.38	.28					.0			.7	.5	.5
11		b .14	.18		.14			(a)	1.6			
12	.42			b .40			.2			.7	.5	.5
13		.32	.18					.4				
14	.40			.11						.5	.5	(a)
15		.28	.14	.08	.22		.2	.5				
16	.36									.8		.5
17		b .28	b .17	.10			.3	.4			1.1	
18	.36								1.6	.7		.4
19		.26	.20	.10		(a)	(a)	.4			.6	
20	.36									.6		.3
21		.22	.10	.08		.1	.3	.4			.6	
22	.36								.9	.5		.6
23		.24	.12	.10		.3	.3	.5			.6	
24	.36									.6		.4
25		.24	.08	.12		.2	.2	.5			.6	
26	.36								1.2	.6		.4
27		.20	.10	.20		(a)	.4	.4			b .8	
28	.36									.7		.2
29		.22	.08	.12		.2	.6	.6	1.0		b .8	.0
30	.38									.4		
31			.10	.14		.3		.4		.4	.6	
Total for month	5.54	3.45	2.14	1.95	.80	1.1	3.9	6.8	7.8	9.7	9.9	6.2

a Record started. b Estimated.

NOTE.—Breaks in record Feb. 6, 16–27, Mar. 26, Apr. 18, May 10, Sept. 13, and 30, due to storms. Pan was sunk by storm Feb. 27; no record Feb. 27 to Mar. 18.

SOUTH FORK OF TUOLUMNE RIVER NEAR SEQUOIA, CALIF.

LOCATION.—In NW. ¼ sec. 31, T. 1 S., R. 19 E., at highway bridge at Harden ranch, 600 feet above Hazel Green Creek, 1 mile above intake of Golden Rock ditch, and 3 miles west of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 11, 1914, to February 23, 1918, when station was discontinued.

GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read by employees of Yosemite Power Co.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shifts during high water. Banks are high but right bank may be overflowed at extreme high water.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 8.0 feet at 7 a. m. and 5 p. m. January 25, 1914 (discharge, determined from extension of rating curve, about 3,510 second-feet); minimum stage recorded, 0.9 foot January 11, 1918 (discharge, 0.5 second-foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 7 and 500 second-feet and extended above. Gage read to half-tenths twice daily from October 1, to November 10, once daily November 11, to January 2, and twice a week after January 2. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Yosemite Power Co.

Discharge measurements of South Fork of Tuolumne River near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 16	1.41	11
Mar. 13	2.80	208
Aug. 10	1.40	10

Daily discharge, in second-feet, of South Fork of Tuolumne River near Sequoia, Calif., for the period Oct. 1, 1917 to Feb. 23, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.
1	9	7.5	42	10	a4.5	16	7.5	10	14	a1.8	17
2	9	7.5	42	14	7	17	9	10	14	2.0	24
3	9	7.5	33	a12	a9	18	9	10	14	a1.8	33
4	9	7.5	28	9	a11	19	10	10	14	1.5	24
5	9	9	20	a8	a13	20	10	10	14	a1.8	33
6	9	17	14	a6.5	a16	21	10	10	14	2.0	147
7	9	14	14	5.5	a18	22	10	10	14	a1.45	66
8	9	10	10	a5.0	a20	23	10	10	10	7	94
9	9	10	10	4.0	a22	24	10	10	10	a6	.....
10	7.5	10	10	a2.2	24	25	10	10	10	a5.0	.....
11	7	10	10	.5	17	26	9	10	14	4.0	.....
12	7	17	10	a.8	17	27	9	10	14	a4.0	.....
13	7	14	14	a1.2	66	28	7.5	10	10	4.0	.....
14	7	14	14	1.5	42	29	7.5	10	10	a3.3	.....
15	7	10	14	a1.7	17	30	7.5	10	10	a2.7	.....
						31	7.5	.....	10	2.0	.....

a Gage not read; discharge interpolated.

Monthly discharge of South Fork of Tuolumne River near Sequoia, Calif., for the period Oct. 1, 1917 to Feb. 23, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	7	8.61	529
November	17	7.5	10.5	625
December	42	10	15.5	953
January	14	.5	4.36	268
February 1–23	147	4.5	32.2	1,470
The period	.....	.....	.....	3,840

SOUTH FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS, CALIF.

LOCATION.—At South Fork trail bridge, in Stanislaus National Forest, one-fourth mile above junction with Tuolumne River and 2 miles northeast of Buck Meadows, Mariposa County. Middle Fork enters 2½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 13, 1910, to September 30, 1918 (very fragmentary up to September 30, 1916).

GAGE.—Stevens continuous water-stage recorder on right bank about 600 feet above trail bridge, at same location and datum as inclined staff gage installed May 19, 1914. Previous to this date gage was a vertical staff on middle pier of bridge at downstream end and at the same datum as present gage. Present gage installed November 4, 1916.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; very rough; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.95 feet at 11 a. m. March 7 (discharge, 1,920 second-feet); minimum stage from water-stage recorder, 2.30 feet September 5 (discharge, 4.7 second-feet).

1910–1918: Maximum stage recorded, between 8 and 10 feet January 25, 1914. A camper at the bridge said that on that date the water touched the under stringers of the footbridge (discharge not determined); minimum stage recorded, 0.70 foot (old gage) September 15, 1913 (discharge, 3 second-feet); lower stages have given higher discharges.

DIVERSIONS.—At Harden ranch, 7 miles above the mouth, water is diverted for use in vicinity of Groveland.

REGULATION.—A small amount of storage is developed at Harden ranch.

ACCURACY.—Stage-discharge relation has not changed in several years. Rating curve well defined. Mean daily gage height determined by averaging mean hourly gage heights. Daily discharge ascertained by applying mean daily gage height to rating table, except December 1, February 6, 7, 21, 24, March 6, 10, and 18, when hourly discharge was averaged. Records good.

Discharge measurements of South Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 10	2.42	6.5	Feb. 28	3.57	66	May 4	5.57	654
18	2.69	16	Mar. 5	3.74	87	24	5.22	496
Nov. 5	2.50	8.2	8	4.82	315	28	4.72	296
20	2.55	8.8	12	6.56	1,480	31	4.88	338
30	2.57	9.8	Apr. 1	4.89	350	June 14	4.48	218
Dec. 5	2.78	16	22	5.24	499	Aug. 9	2.40	4.9
Feb. 25	3.95	116						

Daily discharge, in second-feet, of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.5	8	26	14	15	64	365	484	393	45	9	6.5
2	8.5	8	42	14	20	67	358	552	424	72	8.5	6
3	8.5	8	28	13	17	72	286	543	412	67	8.5	6
4	8.5	8	19	13	18	85	247	640	420	52	8	4.8
5	8.5	8	16	13	18	100	232	645	412	45	7	4.7
6	8	10	15	13	33	263	235	605	400	40	7	4.8
7	8	11	14	13	174	1,050	232	610	390	36	7	5
8	8	10	13	13	54	362	250	595	382	32	6	6
9	8	10	14	13	38	210	286	464	348	30	6	5.5
10	7	10	14	12	31	393	348	400	330	28	6	5.5
11	6.5	9.5	13	12	29	682	344	358	316	26	6	5
12	7	10	13	17	27	930	340	382	286	24	6	5.5
13	7	11	14	19	31	460	334	472	260	23	6	7.5
14	7	10	15	17	32	320	280	548	222	22	6	24
15	7	10	12	17	27	259	280	520	188	21	6	16
16	7.5	10	11	15	24	238	289	408	173	19	6.5	12
17	8	10	13	15	41	222	330	448	166	18	6.5	10
18	13	9.5	13	16	36	424	376	400	144	17	6.5	8.5
19	8	9.5	13	16	31	1,100	390	448	130	16	6.5	7
20	8	9.5	13	13	38	498	412	494	130	15	6	7
21	8	9.5	12	13	98	368	460	480	120	14	6	7
22	8	9.5	12	13	326	320	502	498	103	13	6	8
23	8	9.5	12	15	181	295	516	502	90	14	6	9.5
24	8	9.5	12	15	525	286	507	480	82	13	5.5	9
25	8	9.5	13	15	143	286	502	460	73	12	5.5	8
26	8	9.5	22	14	100	379	448	404	65	12	5.5	7
27	8	9.5	24	12	82	570	440	354	59	12	5.5	6.5
28	8	9.5	19	16	72	368	436	312	54	10	5.5	7
29	8	10	16	18	.....	330	494	286	50	10	4.8	10
30	8	10	15	16	.....	330	460	292	47	9.5	4.8	15
31	8	.....	14	14	.....	351	.....	365	.....	9	6	.....

Monthly discharge of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	13	6.5	8.02	493
November	11	8	9.53	567
December	42	11	16.2	996
January	19	12	14.5	892
February	524	15	80.7	4,480
March	1,100	64	377	23,200
April	516	232	366	21,800
May	645	286	466	28,700
June	424	47	222	13,200
July	72	9	25.0	1,540
August	9	4.8	6.33	389
September	24	4.7	8.14	484
The year	1,100	4.7	134	96,700

MIDDLE FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 28, T. 1 S., R. 18 E., 800 feet below Hog ranch road highway bridge, half a mile above junction with South Fork of Tuolumne River, and 4 miles east of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1916, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from Hog ranch road bridge or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel; permanent. Control is granite ledge across channel 100 feet below gage. One channel at all stages, straight for 100 feet above and 200 feet below gage; banks clear.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.32 feet at 5.30 a. m. March 19 (discharge, 558 second-feet); minimum stage, from water-stage recorder, 0.71 foot September 5 and 6 (discharge, 1.7 second-feet).

1917–1918: Maximum stage from water-stage recorder, 6.7 feet at 4 p. m. February 21, 1917 (discharge 912 second-feet); minimum stage, from water-stage recorder, 0.71 foot September 5 and 6, 1918 (discharge 1.7 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 600 second-feet and extended above. Mean daily gage height determined by inspecting recorder graph. Mean daily discharge ascertained by applying mean daily gage height to rating table except February 21, 23, 24, March 6, 10, and September 30, when mean hourly discharge was averaged. Records excellent.

Discharge measurements of Middle Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	0.76	2.0	Mar. 9	2.17	49	Apr. 24	3.50	207
17	.72	1.8	13	3.00	130	May 6	4.05	298
Nov. 7	.90	3.4	14	2.68	98	June 13	3.20	155
Dec. 29	1.17	7.7	Apr. 11	2.90	116	Aug. 8	.82	2.5
Feb. 26	1.74	25	20	3.15	153			

Daily discharge, in second-feet, of Middle Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.9	2.0	7.5	6.0	5.0	21	102	239	248	29	5.5	2.5
2	2.8	2.1	12	5.5	6.0	21	105	273	264	47	5.5	2.4
3	2.7	2.1	9.5	5.5	5.0	23	86	273	264	45	5.0	2.3
4	2.5	2.3	6.5	4.9	5.5	26	73	325	273	35	4.0	1.9
5	2.4	2.4	6.0	5.0	6.0	29	70	334	264	30	3.5	1.7
6	2.3	3.2	5.5	5.5	11	104	73	316	264	26	3.3	1.7
7	2.2	3.6	4.7	5.0	45	298	70	325	264	24	3.0	1.9
8	2.1	3.9	4.2	5.5	17	92	80	307	256	22	2.7	2.0
9	2.1	4.3	4.7	5.0	14	57	93	239	231	20	2.7	2.1
10	2.0	4.0	4.9	3.9	13	120	113	201	223	18	2.8	2.0
11	2.0	3.6	4.3	3.7	12	190	116	184	215	17	2.8	2.0
12	2.0	3.9	4.2	6.5	12	307	119	204	199	16	2.8	2.0
13	2.0	4.4	4.4	7.0	13	132	116	256	172	16	2.8	2.9
14	1.9	4.6	4.9	6.5	12	100	99	298	154	15	2.9	6.0
15	1.9	4.3	4.4	6.5	9.5	83	102	290	130	15	3.0	7.5
16	1.8	4.0	4.4	6.5	10	76	109	231	118	14	3.2	7.0
17	1.8	3.9	5.0	6.0	15	70	126	256	112	14	3.4	4.9
18	1.8	3.7	5.0	6.5	12	120	143	231	97	13	3.4	3.7
19	1.9	3.9	5.5	6.0	12	307	150	264	86	12	3.4	3.2
20	1.9	3.9	5.5	4.3	14	138	162	290	86	12	3.2	2.8
21	1.9	3.7	5.0	5.0	39	108	182	290	77	10	3.2	2.8
22	1.9	3.7	5.0	4.4	104	96	207	290	66	10	3.0	3.7
23	2.0	3.7	5.0	5.5	89	89	223	298	57	10	2.9	3.6
24	1.9	3.9	5.0	5.5	165	86	223	290	53	9	2.6	3.4
25	1.9	4.2	5.5	5.5	41	86	223	273	46	9	2.6	3.5
26	1.9	4.3	7.5	4.2	29	118	201	248	42	8.5	2.6	3.3
27	1.9	4.3	10.0	3.0	24	161	199	207	38	8	2.5	3.2
28	2.3	4.0	8.5	5.0	22	105	197	180	34	7	2.1	3.3
29	2.3	4.0	7.0	6.0	.....	90	231	167	32	6.5	1.9	4.3
30	2.1	4.3	6.5	5.0	.....	89	223	173	30	6	1.9	9.5
31	2.0	.....	5.5	5.0	.....	95	.....	223	.....	6	2.7	.....

NOTE.—No gage-height record Jan. 28–31; discharge estimated.

Monthly discharge of Middle Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.9	1.8	2.10	129
November	4.6	2.0	3.67	218
December	12	4.2	5.92	364
January	7	3.0	5.34	328
February	165	5	27.2	1,510
March	307	21	111	6,830
April	231	70	141	8,390
May	334	167	257	15,800
June	273	30	146	8,690
July	47	6	17.1	1,050
August	5.5	1.9	3.13	192
September	9.5	1.7	3.44	205
The year	334	1.7	60.4	43,700

SIERRA & SAN FRANCISCO POWER CO.'S CANAL[1] NEAR LA GRANGE, CALIF.

LOCATION.—In SW. ¼ sec. 16, T. 3 S., R. 14 E., at short flume opposite La Grange dam just above waste gate, three-fourths mile above power house, 1¼ miles northeast of La Grange, Stanislaus County, and 13¾ miles below intake on Tuolumne River.

RECORDS AVAILABLE.—1908 to September 30, 1918 (not complete).

GAGE.—Enameled vertical staff on right side of flume near upper end; read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made in flume just below gage.

CHANNEL AND CONTROL.—Rectangular ditch excavated mostly in shale rock.

EXTREMES OF DISCHARGE.—Maximum discharge recorded, 68 second-feet most of summer of 1916, part of 1917, and summer of 1918.

ACCURACY.—Stage-discharge relation changed from previous years. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Turlock irrigation district through R. V. Meikle, chief engineer.

The Sierra & San Francisco Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, in SW. ¼ sec. 6, T. 2 S., R. 15 E., about 15 miles above the town of La Grange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of La Grange, and is now locally known as the "La Grange mining ditch." Having been thoroughly repaired, it is used as a supply canal for the hydroelectric plant that was installed in the last part of 1907. The power house in on the left bank of the river about one-half mile above the town of La Grange and is below the dam and headworks of the Turlock and Modesto irrigation canals. Water diverted by canal is returned to river at power house.

Discharge measurements of Sierra & San Francisco Power Co.'s canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 25	Charles Leidl	2.89	67
July 30	J. F. Kunesh	2.83	66

[1] Owned and operated by Yosemite Power Co. until 1917.

Daily discharge, in second-feet, of Sierra & San Francisco Power Co.'s canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	61	61	64	61	61	64	64	64	68	68	64	64
2	61	61	61	61	64	64	64	64	68	68	64	64
3	61	61	61	61	64	64	64	64	68	68	64	64
4	61	61	61	61	64	64	64	64	42	68	64	64
5	61	61	61	a 61	64	64	64	64	68	68	64	64
6	61	61	61	61	64	64	64	64	68	68	64	58
7	61	61	61	61	64	16.6	64	11.7	68	68	58	64
8	61	61	61	61	64	18.7	64	b 43	64	68	64	64
9	61	61	61	61	64	64	64	68	68	64	64	64
10	55	61	a 61	61	64	64	42	64	68	68	64	64
11	51	61	61	61	64	61	64	68	68	68	64	39
12	61	61	61	61	64	58	64	68	68	64	64	64
13	61	b 41	61	61	64	48	64	68	68	64	64	b 43
14	61	61	61	61	64	61	64	a 45	68	64	42	64
15	61	61	61	61	64	64	64	45	68	64	64	64
16	61	61	61	61	64	64	64	68	68	64	64	64
17	61	61	61	61	64	b 43	64	68	68	64	64	b 43
18	61	61	61	61	64	64	64	39	68	64	64	64
19	61	b 41	61	61	64	34	64	68	68	64	b 43	64
20	61	61	61	61	64	64	64	b 68	68	64	64	64
21	61	61	61	61	64	64	64	68	68	64	b 43	64
22	61	61	61	61	64	64	b 43	b 45	68	64	64	64
23	61	61	61	61	64	64	64	a 45	68	64	64	64
24	61	61	61	61	58	64	64	68	68	64	64	64
25	61	b 41	61	61	64	64	64	68	68	64	64	b 43
26	b 41	61	61	61	64	64	64	68	68	64	64	64
27	61	61	61	61	64	61	64	68	68	64	64	b 43
28	61	61	61	61	64	64	64	b 45	68	64	64	64
29	61	61	61	61	.....	64	61	68	68	64	64	64
30	61	61	61	61	.....	64	64	68	68	64	64	64
31	61	.....	61	61	.....	64	.....	68	.....	64	64	.....

a No gage-height record; discharge interpolated.
b No gage-height record: discharge estimated as two-thirds of that for day following.

Monthly discharge of Sierra & San Francisco Power Co.'s canal at La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	41	59.8	3,680
November	61	41	59.0	3,510
December	64	61	61.1	3,760
January	61	61	61.0	3,750
February	64	58	63.7	3,540
March	64	16.6	58.4	3,590
April	64	42	62.5	3,720
May	68	11.7	59.8	3,680
June	68	42	67.0	3,990
July	68	64	65.3	4,020
August	64	42	61.7	3,790
September	64	39	60.2	3,580
The year	68	11.7	61.6	44,600

MODESTO CANAL NEAR LA GRANGE, CALIF.

LOCATION.—In SE. ¼ sec. 17, T. 3 S., R. 14 E., below waste gates, 460 feet below intake at La Grange dam on Tuolumne River, and about 1½ miles northeast of La Grange, Stanislaus County; canal is on right bank of river.

RECORDS AVAILABLE.—April 26, 1903, to September 30, 1918.

GAGE.—Vertical iron staff in concrete well on left bank 460 feet below head gates and below waste gates. Gage read and operation of head gates noted by F. A. Townsend.

DISCHARGE MEASUREMENTS.—Made from footbridge 550 feet below gage.

CHANNEL AND CONTROL.—Canal is concrete lined and control is length of canal. For the last few years timber flumes that formed the canal a mile or more below the station have been gradually replaced by fills with concrete lining; and the cross-section was increased. The discharge per foot stage above 1.5 feet has been increased.

EXTREMES OF DISCHARGE.—1903–1918: Maximum stage recorded, 6.1 feet part of June, 1918 (discharge, 1,220 second-feet).

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths twice daily and manipulation of gates noted. Daily discharge ascertained by applying mean daily gage height to rating table or by averaging results obtained by applying gage heights for parts of day to rating table. Records excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Modesto irrigation district.

The water is used for irrigation in the Modesto irrigation district.

Discharge measurements of Modesto canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 25	Charles Leidl	5.92	1,170	Apr. 20	Modesto irrigation district.	5.00	985
July 30	J. F. Kunesh	.60	37	20	do	5.50	1,120
Apr. 16	Modesto irrigation district.	2.00	309	20	do	5.50	1,120
16	do	3.00	528	May 22	do	5.81	1,140
16	do	4.00	727	22	do	5.91	1,170
17	do	4.00	755	June 4	do	6.00	1,190
17	do	4.51	887				

Daily discharge, in second-feet, of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	287	.....	969	1,190	544	38
2	.....	277	162	1,060	1,190	502	36
3	.....	318	502	1,060	1,190	584	39
4	.....	115	605	1,060	1,190	669	23
5	.....	267	669	1,060	1,190	523	23
6	.....	267	713	1,060	1,190	420	39
7	.....	564	713	1,060	1,190	359	35
8	.....	969	713	1,060	1,190	298	33
9	80	1,040	713	1,060	1,190	256	26
10	155	1,060	713	1,060	1,190	226	28
11	120	1,060	713	1,060	1,220	205	22
12	135	1,060	713	1,060	1,220	191	11.7
13	37	1,060	713	1,090	1,220	167	13.0
14	79	1,060	713	1,120	1,220	147	7.0
15	185	1,060	713	1,120	1,220	141	.....
16	159	1,060	713	1,120	1,220	126	.....
17	153	757	757	1,120	1,220	118	.....
18	267	100	826	1,120	1,220	107	.....
19	179	.....	826	1,140	1,220	100	.....
20	163	.....	826	1,140	1,220	92	.....
21	191	.....	826	1,140	1,220	86	.....
22	277	.....	826	1,140	1,220	82	.....
23	263	.....	826	1,190	1,220	77	.....
24	.....	.....	897	1,190	1,220	72	.....
25	297	283	945	1,190	1,090	68	.....
26	462	669	945	1,190	1,090	61	.....
27	380	897	945	1,190	897	58	.....
28	158	1,040	945	1,190	757	50	.....
29	.....	1,060	945	1,190	669	43	.....
30	.....	1,060	945	1,190	584	42	.....
31	.....	488	.....	1,190	.....	44	.....

NOTE.—No flow Oct. 1 to Feb. 8, Feb. 24, Mar. 19–24 and Aug. 15 to Sept. 30.

Monthly discharge of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	462	0.0	134	7,440
March	1,060	.0	577	35,500
April	945	.0	735	43,700
May	1,190	969	1,120	68,900
June	1,220	584	1,140	67,800
July	669	42	208	12,800
August 1–14	39	.0	12.1	744
The year	1,220	.0	326	237,000

TURLOCK CANAL NEAR LA GRANGE, CALIF.

LOCATION.—Close to north line of NW. ¼ NW. ¼ sec. 21, T. 3 S., R. 14 E., just below H. T. Sackett's house and barn, 2,400 feet below intake at La Grange dam, and 1¼ miles northeast of La Grange, Stanislaus County. Canal is on left bank of Tuolumne River.

RECORDS AVAILABLE.—July, 1899, to September 30, 1918.

GAGE.—Float gage in 8-inch pipe on left bank, 150 feet below observer's house. Previous gage, used until September 14, 1915, was float gage in well just below spillway and about 150 feet be ow intake tunnel. Gage read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made from foot plank across lined section of canal at Snake Ravine, about a mile below gage.

CHANNEL AND CONTROL.—Cut partly lined and fill completely lined. Control is length of channel.

EXTREMES OF DISCHARGE.—1907–1918: Maximum stage recorded, 8.06 feet May 19, 22, and 26 (discharge, 1,750 second-feet); no flow during periods each year. Capacity of canal is about 1,800 second-feet.

ACCURACY.—Stage-discharge relation changed when canal was shut down for the fall. Rating curve well defined. Gage read to hundredths once daily and regulation of head gate recorded. Daily discharge ascertained by applying gage height to rating table and weighting discharges according to duration. Records excellent.

COOPERATION.—Gage-height record and most of discharge measurements furnished by Turlock irrigation district through, R. V. Meikle, chief engineer.

The water is used to irrigate 95,698 acres of Turlock irrigation district.

Discharge measurements of Turlock canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 25	Charles Leidl	7.98	1,710
July 30	J. F. Kunesh	.58	89
Aug. 22	Charles Leidl	.22	62

Daily discharge, in second-feet, of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	52	.....	160	88	667	182	1,630	1,300	1,110	95	42
2	52	.....	145	84	646	175	1,660	1,300	1,080	87	57
3	52	.....	116	81	910	254	1,680	1,380	1,240	95	61
4	52	.....	116	81	910	386	1,690	1,430	1,400	116	68
5	52	.....	130	81	1,030	466	1,710	1,430	1,080	145	46
6	.....	.....	138	81	841	562	1,720	1,430	841	88	53
7	.....	.....	116	205	470	662	1,720	1,520	752	87	29
8	.....	.....	109	774	489	769	1,720	1,550	626	77	29
9	.....	.....	102	818	489	882	1,720	1,580	546	62	28
10	.....	62	95	398	489	946	1,720	1,640	489	68	31
11	.....	102	95	364	527	995	1,720	1,660	452	52	38
12	.....	130	102	330	489	1,040	1,720	1,660	416	52	22
13	.....	74	102	452	470	1,060	1,720	1,700	452	52	.....
14	.....	74	123	452	489	1,000	1,720	1,720	347	62	.....
15	.....	88	230	416	298	910	1,720	1,720	330	62	.....
16	.....	85	190	347	235	910	1,720	1,720	298	62	88
17	.....	85	182	330	147	910	1,720	1,720	282	62	88
18	.....	85	175	566	.....	910	1,720	1,680	250	81	88
19	.....	74	175	416	.....	1,020	1,750	1,660	235	102	123
20	.....	74	205	364	.....	1,100	1,720	1,660	220	102	123
21	.....	74	175	381	.....	1,190	1,720	1,720	212	74	116
22	.....	74	145	489	.....	1,300	1,750	143	198	62	109
23	.....	74	130	489	.....	1,360	1,720	620	190	38	102
24	.....	74	116	688	.....	1,420	1,690	1,420	168	34	102
25	.....	74	116	818	124	1,450	1,710	1,620	160	32	109
26	.....	74	102	958	182	1,500	1,750	1,600	145	27	116
27	.....	74	102	818	175	1,560	1,720	1,270	130	25	95
28	.....	266	102	752	175	1,600	1,640	1,520	116	25	109
29	.....	347	95	.....	175	1,630	1,520	1,430	109	26	102
30	.....	298	68	.....	175	1,630	1,300	1,270	102	26	116
31	.....	175	81	.....	175	.....	1,300	.....	109	31	.....

NOTE.—No gage-height record Aug. 12–17, Aug. 23 to Sept. 3, and Sept. 5–15; discharge estimated from flow of Tuolumne River above the dam and flow of Yosemite Power Co.'s canal and Modesto canal. No flow in canal Oct. 6 to Dec. 9, Mar. 18–24 and Sept. 13–15.

Monthly discharge of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	52	0	8.39	516
November	0	0	0.0	0
December	347	0	81.8	5,030
January	220	68	130	7,990
February	958	81	433	24,000
March	1,030	0	348	21,400
April	1,630	175	993	59,100
May	1,750	1,300	1,680	103,000
June	1,720	143	1,470	87,500
July	1,400	102	454	27,900
August	145	25	64.8	3,980
September	123	0	69.7	4,150
The year	1,750	0	476	345,000

STANISLAUS RIVER AND TRIBUTARIES.

MIDDLE FORK OF STANISLAUS RIVER AT SAND BAR FLAT, NEAR AVERY, CALIF.

LOCATION.—At Sand Bar Flat, in Tuolumne County, 3 miles below Bakers Crossing, 11 miles above junction with North Fork of Stanislaus River, and 11 miles southeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 1, 1905, to September 30, 1918.

GAGE.—Staff showing depth of water over crest of dam. There is also a staff in flume below dam.

DISCHARGE.—Flow over dam is computed from formula developed by company. Current-meter measurements are made in flume. Discharge, as published, is combined flow of river over dam and discharge of flume.

CHANNEL AND CONTROL.—See preceding paragraph.

EXTREMES OF DISCHARGE.—1905–1918: Maximum mean daily discharge, 9,760 second-feet, March 19, 1907; minimum mean daily discharge, 46 second-feet, February 1, 1918.

ICE.—No information.

DIVERSIONS.—None.

REGULATION.—Relief reservoir (capacity of 16,000 acre-feet), on Relief Creek about a mile above the mouth of the creek, is used to store water.

COOPERATION.—Daily discharge record furnished by Sierra & San Francisco Power Co., through H. J. Jackson, general manager. Discharge measurements furnished by the South San Joaquin irrigation district, through A. Griffin, engineer.

Discharge measurements of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., during the year ending Sept. 30, 1918.

[Made by W. H. Hooker.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 3	3.55	[b] 232	Oct. 8	3.60	[b] 236
5	.52	[b] 8.4	8	3.41	[b] 226
5	3.81	[c] 182	8	3.17	[b] 200
6	3.71	[c] 161			

[a] See paragraph on cooperation, p. 13.
[b] Measurement made in flume.
[c] Measurement made 1 mile above dam.

Daily discharge, in second-feet, of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	270	187	131	93	46	112	1,230	2,000	1,390	649	286	252
2	257	202	156	95	54	122	1,350	2,090	1,620	803	290	270
3	229	203	98	94	64	157	951	2,020	1,970	660	288	271
4	222	226	103	96	57	170	814	2,220	2,270	613	285	269
5	230	220	123	133	62	172	721	2,290	2,220	547	292	269
6	210	225	139	91	68	154	802	2,010	2,360	515	289	269
7	166	223	124	75	204	389	834	2,090	2,410	444	300	260
8	221	198	133	75	127	262	912	1,910	2,510	355	286	266
9	234	212	115	75	81	184	1,130	1,560	2,530	313	277	266
10	234	225	108	66	87	198	1,500	1,360	2,560	283	291	268
11	170	211	109	53	91	554	1,580	1,230	2,730	286	295	269
12	168	205	115	79	91	658	1,580	1,340	2,850	281	292	268
13	169	195	97	70	112	537	1,450	1,560	2,860	277	278	275
14	167	198	110	83	93	370	1,190	1,740	2,830	289	292	293
15	155	207	107	76	82	375	1,150	1,620	2,520	290	292	295
16	155	234	96	70	78	392	1,260	1,430	2,160	280	293	261
17	164	230	100	72	103	383	1,410	1,470	2,010	287	294	241
18	179	182	116	65	91	473	1,600	1,360	1,880	286	292	222
19	190	116	143	72	88	630	1,540	1,430	1,770	292	282	218
20	183	138	90	60	88	517	1,580	1,550	1,660	292	293	202
21	182	135	99	57	99	516	1,830	1,560	1,520	274	290	195
22	184	115	112	62	136	542	2,060	1,580	1,370	280	290	155
23	181	115	113	60	115	561	2,160	1,600	1,350	294	291	181
24	180	112	114	82	153	606	2,060	1,540	1,230	293	291	174
25	152	97	108	68	99	680	2,020	1,530	1,060	293	276	159
26	174	95	105	64	113	791	1,930	1,410	949	293	290	141
27	214	102	145	53	118	828	1,910	1,240	931	290	282	133
28	233	162	110	52	116	686	1,780	1,060	859	256	241	149
29	210	165	100	52	.....	738	1,860	956	804	268	246	166
30	198	115	96	57	.....	876	1,790	952	698	268	247	276
31	183	.....	95	60	.....	1,060	.....	1,190	.....	284	250	.....

Monthly discharge of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	270	152	196	12,100
November	234	95	175	10,400
December	156	90	113	6,950
January	133	52	72.9	4,480
February	204	46	97.0	5,390
March	1,060	112	474	29,100
April	2,160	721	1,470	87,500
May	2,290	952	1,580	97,200
June	2,860	698	1,860	111,000
July	803	256	359	22,100
August	300	241	283	17,400
September	295	133	231	13,700
The year	2,860	46	576	417,000

STANISLAUS RIVER NEAR KNIGHTS FERRY, CALIF.

LOCATION.—In SW. ¼ sec. 1, T. 1 S., R. 12 E., 300 feet above old Tulloch dam, 2 miles above Goodwin dam, and 6 miles above Knights Ferry, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 18, 1915, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank in reinforced concrete well and house. Previous to July 28, 1917, record is from a Gurley printing water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock and shifting sand; channel straight for 250 feet above and 300 feet below; one channel at all stages. Control is Tulloch dam. Point of zero flow, gage height 0.9 foot.

EXTREME OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.95 feet at 9 a. m. March 12 (discharge, determined from extension of rating curve, 14,300 second-feet); minimum stage, from water-stage recorder, 1.03 feet at 8 a. m. January 29 (discharge, 58 second-feet).

1916–1918: Maximum stage recorded, 9.11 feet at 3.45 a. m. February 21, 1917 (discharge, determined from extension of rating curve, 17,400 second-feet); minimum stage recorded, 1.03 feet at 8 a. m. January 29, 1918 (discharge, 58 second-feet).

DIVERSIONS.—Ditches diverting water for mining are numerous above the station. Water is also diverted from the South Fork into Tuolumne Basin and from North Fork for use in the vicinity of Murphy and Angels (see Utica Gold Mining Co.'s canal near Avery, p. 168). The water diverted for power development on Middle Fork at Sand Bar Flat near Avery is returned to river above this station.

REGULATION.—Flow is partly regulated by storage in the drainage basins of the Middle Fork (see Relief Creek near Baker Station, p. 165), North Fork, and South Fork.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 10,000 second-feet and is an extension above. Recorder not running during periods stated in footnote to daily-discharge table. Mean daily gage height determined by inspecting record. Daily discharge ascertained by applying mean daily gage height to rating table except March 12 and 19 when hourly discharge was averaged; estimates for periods in November and December obtained from maximum and minimum stages recorded during the periods; estimates of flow for periods in February and March made by comparison with the records from gage heights at the Goodwin dam; for other days for which gage height was not recorded, discharge was interpolated. Records excellent except those estimated.

This station takes the place of the station at Knights Ferry which was discontinued April 30, 1916.

Discharge measurements of Stanislaus River near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 10	Charles Leidl	1.34	224
May 21	....do	3.42	3,130
July 31	J. F. Kunesh	1.36	246

Daily discharge, in second-feet, of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	294	225	207	190	115	390	2,780	4,040	1,930	608	307	219
2	320	237	327	186	115	390	2,950	4,380	2,380	551	314	231
2	320	243	281	182	146	390	2,300	4,260	3,040	608	307	255
4	274	243	231	178	105	390	1,840	4,610	3,460	551	314	249
5	231	219	201	184	130	430	1,620	4,840	3,460	542	268	225
6	231	249	195	140	151	470	1,620	4,260	3,580	462	288	243
7	231	249	190	141	430	7,680	1,650	4,380	3,690	406	288	249
8	201	.....	184	143	497	3,240	1,820	4,260	3,690	362	288	249
9	213	.....	184	145	314	1,380	2,170	3,580	3,800	355	300	243
10	231	.....	162	146	281	1,320	3,150	2,720	3,800	320	274	213
11	195	.....	173	146	237	2,760	3,280	2,320	3,800	288	274	255
12	195	.....	184	140	237	11,800	3,580	2,300	4,040	314	249	243
13	195	.....	184	151	237	4,600	3,150	2,720	4,040	307	288	294
14	190	.....	173	151	288	2,170	2,460	3,260	4,150	294	288	348
15	190	.....	168	173	300	1,570	2,320	3,200	3,690	307	268	560
16	195	.....	162	156	274	1,400	2,380	2,890	3,000	307	281	355
17	195	.....	.....	146	355	1,200	2,740	2,870	2,610	307	268	268
18	195	.....	.....	146	348	1,600	3,200	2,670	2,400	294	274	252
19	195	.....	.....	151	300	8,210	3,060	2,650	1,970	294	268	237
20	195	262	.....	156	268	3,460	3,310	2,980	1,890	307	274	222
21	201	178	.....	135	560	2,380	3,690	3,040	1,740	294	268	207
22	195	156	.....	125	2,340	1,970	4,260	3,000	1,520	314	255	184
23	195	156	.....	105	1,140	1,860	4,500	3,170	1,350	281	255	207
24	207	156	.....	135	3,690	1,780	4,260	3,000	1,230	268	255	190
25	219	168	.....	125	1,000	1,840	4,040	2,820	1,010	268	268	190
26	237	151	.....	140	588	2,030	3,920	2,610	888	281	237	184
27	201	156	.....	130	515	2,700	3,920	2,300	818	294	262	178
28	225	146	255	125	454	1,990	3,580	1,860	760	281	243	178
29	213	156	225	90	.....	1,880	3,920	1,530	686	268	195	184
30	231	156	201	95	.....	2,090	3,920	1,370	608	281	225	178
31	231	.....	178	90	.....	2,400	.....	1,340	.....	294	243	.....

NOTE.—Discharge for days for which gage height is not recorded determined as follows: Nov. 8–19 estimated as 250 second-feet; Dec. 17–27 estimated as 200 second-feet; Feb. 28 to Mar. 8 and Mar. 13–15 estimated from the gage heights at the Goodwin dam, Jan. 2, 3, 7–9, and Sept. 18–20 interpolated.

Monthly discharge of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	320	190	221	13,600
November	.....	146	217	12,900
December	327	.....	202	12,400
January	190	90	143	8,790
February	3,690	105	551	30,600
March	11,800	390	2,510	154,000
April	4,500	1,620	3,050	181,000
May	4,840	1,340	3,070	189,000
June	4,150	608	2,500	149,000
July	608	268	352	21,600
August	314	195	271	16,700
September	560	178	243	14,500
The year	11,800	90	1,110	804,000

RELIEF RESERVOIR NEAR BAKER STATION, CALIF.

LOCATION.—Dam is in NW. ¼ sec. 13, T. 5 N., R. 20 E., on Relief Creek, about five-eighths mile above junction with East Fork and 3½ miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1910, to September 30, 1918.

GAGE.—No information.

EXTREMES OF STORAGE.—1910–1918: Maximum storage recorded, 15,600 acre-feet July 26, 1917; reservoir empty during parts of each year.

COOPERATION.—Daily-storage record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

The reservoir is used for storage for power by the Sierra & San Francisco Power Co. The water is released down Relief Creek to the Middle Fork of Stanislaus River at Sand Bar Flat, where it is diverted.

Daily storage, in acre-feet, of Relief reservoir near Baker Station, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,200	6,500	2,400	308	90	4,120	14,600	15,300	12,300	4,420
2	10,000	6,340	2,340	282	182	4,470	15,000	15,300	12,000	4,130
3	9,910	6,160	2,360	237	230	4,810	15,200	15,300	11,800	3,980
4	9,800	5,960	2,300	124	259	5,200	15,000	15,300	11,500	3,750
5	9,770	5,760	2,220	.....	290	5,700	15,100	15,200	11,300	3,540
6	9,700	5,650	2,110	.....	310	6,120	15,200	15,200	11,000	3,320
7	9,580	5,540	1,990	.....	337	6,620	15,200	15,200	10,800	3,090
8	9,620	5,380	1,900	.....	372	7,050	15,300	15,200	10,500	2,930
9	9,520	5,080	1,840	.....	402	7,300	15,200	15,200	10,200	2,720
10	9,260	5,040	1,760	.....	478	7,550	15,200	15,300	9,870	2,520
11	9,160	4,920	1,620	.....	602	7,720	15,300	15,300	9,600	2,330
12	9,070	4,820	1,550	.....	690	7,920	15,300	15,200	9,380	2,080
13	9,010	4,670	1,500	.....	784	8,100	15,300	15,200	9,080	1,880
14	8,940	4,520	1,430	.....	874	8,500	15,300	15,200	8,840	2,040
15	8,860	4,280	1,390	.....	984	8,850	15,100	15,100	8,520	2,040
16	8,840	4,020	1,340	.....	1,030	9,140	15,100	15,000	8,190	1,980
17	8,660	3,740	1,280	.....	1,150	9,420	15,100	14,900	7,920	1,870
18	8,540	3,680	1,130	.....	1,260	9,650	15,100	14,800	7,640	1,830
19	8,420	3,620	1,050	.....	1,360	9,940	15,200	14,700	7,430	1,790
20	8,290	3,450	992	.....	1,520	10,400	15,100	14,500	7,120	1,720
21	8,140	3,390	902	.....	1,680	10,700	15,100	14,400	6,860	1,680
22	8,040	3,310	812	.....	1,880	11,200	15,100	14,200	6,560	1,650
23	7,920	3,220	730	.....	2,140	11,700	15,300	14,100	6,280	1,760
24	7,790	3,130	638	.....	2,450	12,100	15,200	13,900	5,980	1,740
25	7,650	3,050	581	.....	2,610	12,600	15,100	13,700	5,680	1,710
26	7,470	2,960	505	.....	2,900	13,000	15,200	13,500	5,450	1,680
27	7,250	2,860	527	.....	3,130	13,300	15,300	13,300	5,210	1,690
28	7,110	2,700	483	.....	3,350	13,500	15,300	13,200	5,060	1,710
29	6,900	2,580	443	.....	3,540	13,700	15,300	13,000	4,920	1,920
30	6,780	2,490	398	.....	3,740	13,800	15,200	12,800	4,820	2,130
31	6,670	.....	346	.....	.....	14,100	.....	12,500	4,600	.....

NOTE.—Reservoir empty Jan. 5 to Mar. 31: no record July 14, storage interpolated.

RELIEF CREEK NEAR BAKER STATION, CALIF.

LOCATION.—In NW. ¼ sec. 13, T. 5 N., R. 20 E., one-fourth mile below Relief reservoir of Sierra & San Francisco Power Co., one-fourth mile above junction with East Fork, and 3 miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October, 1910, to September 30, 1918 (incomplete).

GAGE.—No information.

DISCHARGE.—Computed from gage-height record at weir, which gives the combined flow over spillway and through outlet gates of dam.

CHANNEL AND CONTROL.—See preceding paragraph.

EXTREMES OF DISCHARGE.—1912–1918: Maximum daily discharge recorded, 795 second-feet, June 23, 1914; no flow part of 1913 and 1918.

ICE.—No information.

DIVERSIONS.—None.

REGULATION.—See record of Relief reservoir, page 164.

COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Daily discharge, in second-feet, of Relief Creek near Baker Station, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	85	35	33	6	12	16	99	121	116
2	100	100	16	33	6	13	15	138	126	116
3	50	100	17	33	5.5	13	399	125	126	116
4	50	100	68	83	5.5	13	495	110	126	116
5	25	85	68	9	5.5	13	415	158	129	116
6	65	69	78	7.5	5.5	15	557	89	129	116
7	65	69	78	6.5	5.5	16	629	65	129	116
8	65	100	56	6.5	7	16	499	65	132	100
9	44	88	46	4.6	7	17	540	45	132	100
10	50	88	46	4.6	7	13	515	46	135	116
11	50	48	46	4.6	7.5	13	546	46	135	116
12	50	48	37	4.6	8	17	723	43	135	116
13	34	88	37	4.6	8	17	712	42	129	116
14	50	138	51	.....	8	17	712	88	129	83
15	34	138	37	.....	8	17	577	62	135	62
16	65	174	37	.....	8	17	393	62	135	62
17	86	53	46	.....	8	17	364	74	135	40
18	65	53	122	.....	8	17	361	74	129	40
19	65	53	33	.....	8	17	364	100	135	40
20	65	90	33	.....	8	16	301	100	135	25
21	65	53	58	.....	8	16	301	90	135	25
22	65	53	58	.....	8	16	212	90	135	0
23	65	33	58	.....	8.5	16	240	90	139	9
24	81	33	58	.....	9.5	16	229	96	139	9
25	86	33	33	.....	11	16	182	96	139	9
26	114	45	33	.....	11	16	118	96	139	0
27	114	105	33	.....	12	16	138	96	85	9
28	83	105	33	.....	12	16	138	96	85	9
29	83	60	33	.....	12	16	138	104	85	9.5
30	83	35	33	.....	12	16	116	111	85	9.5
31	85	.....	33	.....	.....	17	.....	121	85	.....

NOTE.—No flow Jan. 14 to Mar. 31.

Monthly discharge of Relief Creek near Baker Station, Calif., for the year ending Sept. 30 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	114	25	67.2	4,130
November	174	33	77.4	4,610
December	122	16	46.8	2,880
January	83	0	7.56	465
April	12	5.5	8.13	484
May	17	13	15.6	959
June	723	15	365	21,700
July	158	42	87.6	5,390
August	139	85	125	7,690
September	116	0	63.9	3,800
The year	723	0	72.0	52,100

NOTE.—Computed by engineers of U. S. Geological Survey.

NORTH FORK OF STANISLAUS RIVER NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 700 feet above intake of Utica Gold Mining Co.'s canal and 5 miles northeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on right bank; read by James Hunter.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage or by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; apparently permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet April 30 and May 1 (discharge, 1,960 second-feet); minimum stage recorded, 0.85 foot November 28 and 30 (discharge, 28 second-feet).

1914–1918: Maximum stage recorded, 8.7 feet May 11, 1915 (discharge, 5,250 second-feet); minimum stage recorded, 0.85 foot November 28 and 30, 1917 (discharge, 28 second-feet.

DIVERSION.—Water is diverted from Beaver Creek into the North Fork of Stanislaus River about half a mile above the station.

REGULATION.—Flow regulated to some extent by reservoirs on the headwaters of this stream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 4,000 second-feet. Gage read to half-tenths once on alternate days. Daily discharge ascertained by applying gage to rating table, and interpolated for days on which gage was not read. Records good; low-water records subject to some uncertainty owing to effect of regulation.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

No discharge measurements were made during the year ending September 30, 1918.

Daily discharge, in second-feet, of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	41	31	38	31	98	585	1,960	675	98	66	47
2	62	46	34	38	31	103	608	1,920	720	213	66	47
3	59	50	36	38	a 31	108	630	1,880	745	328	66	47
4	58	52	36	38	108	160	630	1,840	770	328	64	47
5	56	53	36	38	108	212	630	1,790	795	328	62	47
6	54	54	36	38	108	254	652	1,700	820	312	60	46
7	53	56	36	38	103	295	675	1,620	848	295	59	44
8	53	56	34	38	98	401	698	1,470	875	280	59	44
9	53	56	31	38	94	507	720	1,320	848	265	59	44
10	50	54	36	38	89	394	825	1,280	820	238	60	47
11	47	53	41	38	85	280	930	1,250	779	212	62	50
12	47	56	44	38	81	194	960	1,220	770	200	62	60
13	47	56	47	40	79	108	990	1,180	745	189	62	70
14	42	56	52	41	77	94	1,020	1,150	720	178	62	72
15	38	56	56	41	74	81	1,050	1,120	698	168	62	73
16	38	56	58	41	70	90	1,120	1,080	675	150	62	70
17	38	56	59	41	66	99	1,180	1,050	652	133	62	66
18	37	56	60	41	62	108	1,250	1,050	630	120	62	62
19	36	54	62	41	64	168	1,320	1,050	608	108	62	59
20	36	53	64	41	66	202	1,360	990	585	98	60	53
21	36	52	66	41	68	267	1,400	930	546	89	59	47
22	36	50	66	41	70	282	1,470	902	507	81	59	44
23	36	48	66	40	74	328	1,540	875	434	73	59	41
24	36	47	68	38	77	436	1,580	848	361	73	59	41
25	36	42	70	37	83	545	1,620	820	328	73	57	41
26	36	36	70	36	89	630	1,660	795	295	73	55	41
27	36	32	70	34	94	608	1,700	770	222	73	53	41
28	36	28	70	31	98	585	1,790	722	149	73	50	41
29	36	28	70	31	.....	585	1,880	675	89	73	47	41
30	36	28	56	31	.....	585	1,960	630	94	73	47	41
31	36	.....	44	31	.....	585	.....	652	.....	73	47	.....

a Estimated by comparison with record of flow of Middle Fork of Stanislaus River near Avery.

Monthly discharge of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	66	36	44.1	2,710
November	56	28	48.7	2,900
December	70	31	51.8	3,190
January	41	31	37.9	2,330
February	108	31	77.8	4,320
March	630	81	302	18,600
April	1,960	585	1,150	68,400
May	1,960	630	1,180	72,600
June	875	89	593	35,300
July	328	73	163	10,000
August	66	47	59.1	3,630
September	73	41	50.5	3,000
The year	1,960	28	313	226,980

UTICA GOLD MINING CO.'S CANAL NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 450 feet below headworks on North Fork of Stanislaus River and 5 miles northeast of Avery, Calaveras County.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1918.

GAGE.—Enameled vertical staff gage, installed May 19, 1915, on right side of flume gage used previous to May 19, 1915, was vertical staff 300 feet above and on the right bank, so near the head gate that it could not be properly rated. Gage read by James Hunter.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 1.65 feet May 19, 1915 (discharge, 116 second-feet).

ICE.—Stage-discharge relation may be affected by ice but not during the year ending September 30, 1918.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths on alternate days. Daily discharge ascertained by applying daily gage height to rating table interpolated for days on which gage was not read except February 3, which was estimated to be the same as the day previous. Records good.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

No discharge measurements were made during the year ending September 30, 1918.

Daily discharge, in second-feet, of Utica Gold Mining Co's. canal near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	61	34	24	31	19	70	74	79	79	79	74	46
2	57	36	26	31	19	70	74	79	79	79	72	46
3	53	38	28	31	19	70	74	79	79	79	70	46
4	50	40	28	31	61	70	74	79	79	79	68	46
5	46	42	28	31	64	70	74	79	79	79	66	46
6	46	44	28	31	66	70	74	79	79	76	66	46
7	46	46	28	31	66	70	74	79	79	74	66	46
8	46	46	26	31	66	70	74	79	79	74	64	46
9	46	46	24	31	66	70	74	79	79	74	61	46
10	46	46	28	31	66	70	74	79	79	74	61	54
11	46	46	31	31	66	70	74	79	79	74	61	61
12	38	46	32	31	66	72	74	79	79	72	61	66
13	38	44	34	31	66	74	74	79	79	70	61	70
14	34	42	36	31	66	74	74	79	79	70	61	74
15	31	40	38	31	66	74	74	79	79	70	61	79
16	31	38	40	31	66	74	74	79	79	70	61	74
17	31	36	42	34	60	74	74	79	79	70	61	70
18	31	34	44	38	53	74	74	79	79	70	61	66
19	31	32	46	38	57	74	74	79	79	70	61	61
20	31	31	50	38	61	74	74	79	79	70	61	54
21	31	30	53	36	64	74	74	79	79	70	61	46
22	31	28	53	34	66	74	74	79	79	70	59	46
23	31	28	53	32	66	74	74	79	79	70	57	46
24	31	28	57	31	66	74	76	79	79	70	57	46
25	31	28	61	28	66	74	79	79	76	70	53	46
26	31	28	61	24	66	74	79	79	74	70	50	46
27	31	26	61	22	68	74	79	79	72	70	46	46
28	31	24	61	19	70	74	79	79	70	70	46	46
29	31	24	61	19	.....	74	79	79	70	70	46	46
30	31	24	31	19	.....	74	79	79	74	70	46	46
31	31	.....	31	19	.....	74	.....	79	.....	70	46	.....

Monthly discharge of Utica Gold Mining Co's. canal near Avery, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	31	38.1	2,340
November	46	24	35.8	2,130
December	61	24	40.1	2,470
January	38	19	29.9	1,840
February	70	19	59.7	3,320
March	74	70	72.5	4,460
April	79	74	75.1	4,470
May	79	79	79.0	4,860
June	79	70	77.7	4,620
July	79	70	72.4	4,450
August	74	46	59.5	3,660
September	79	46	53.4	3,180
The year	79	19	57.7	41,800

SOUTH SAN JOAQUIN CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—At footbridge three-fourths mile below head gate at Goodwin dam, on Stanislaus River, and 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1918. Also miscellaneous measurements and rough estimates for 1913.

[1] Also known as main supply canal.

GAGE.—Vertical staff in gage well on left bank installed March 12, 1915; original gage was inclined staff on right bank 100 feet below and probably at the same datum. Gage read by W. M. Craig.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and is concrete lined.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 8.75 feet May 21, 22, and 23, 1918 (discharge, 891 second-feet), no flow several periods each year.

ACCURACY.—Stage-discharge relation changed when canal was cleaned between February 19 and March 9. Old and new rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Daily gage-height record furnished by South San Joaquin irrigation district, through A. Griffin, engineer.

South San Joaquin canal is on the right bank of the river. The water is used for irrigation in the Oakdale and South San Joaquin districts.

Discharge measurements of South San Joaquin canal near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 22	Charles Leidl	8.72	887
July 31	J. F. Kunesh	3.27	236

Daily discharge, in second-feet, of South San Joaquin canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	204	137	13	.....	76	.....	.....	269	872	449	221	177
2	226	137	13	6.2	76	.....	.....	221	872	389	221	134
3	250	137	9.8	20	92	.....	.....	269	872	521	221	177
4	215	137	.....	14	76	.....	17	557	872	437	221	221
5	147	137	.....	.....	76	.....	144	689	872	425	210	188
6	158	137	.....	.....	69	.....	199	749	860	341	210	177
7	158	137	.....	.....	147	.....	106	797	860	329	210	188
8	137	137	11	.....	250	.....	102	847	860	305	210	177
9	127	137	16	.....	272	18.5	102	810	872	293	221	177
10	169	46	11	.....	261	9.7	139	847	872	269	210	177
11	147	.....	.....	.....	215	.....	221	847	872	245	210	188
12	147	.....	.....	.....	158	.....	221	834	872	269	188	177
13	137	.....	.....	.....	147	.....	221	834	872	257	233	221
14	137	.....	.....	13.5	192	7.8	221	847	884	257	221	353
15	127	.....	20	92	204	42	293	847	872	269	221	341
16	147	.....	28	122	169	74	365	847	872	257	221	329
17	137	.....	8.2	137	192	78	341	872	884	245	221	177
18	137	.....	.....	137	261	81	377	884	884	221	221	188
19	147	9.2	.....	132	108	21	377	884	884	221	221	166
20	147	13	.....	127	.....	36	401	884	884	221	221	134
21	147	13	.....	109	.....	42	473	884	884	233	221	144
22	158	13	6.7	84	.....	42	521	884	884	245	199	155
23	204	13	20	80	.....	42	557	884	884	221	199	144
24	215	13	15.4	80	.....	42	545	884	884	210	177	144
25	204	13	.....	76	.....	42	545	884	847	210	210	144
26	192	13	.....	92	.....	30	545	872	749	221	188	129
27	192	13	.....	100	.....	.....	545	884	677	221	210	124
28	180	13	.....	96	.....	.....	545	884	641	221	199	129
29	158	13	.....	69	.....	.....	545	872	557	210	144	129
30	137	13	.....	69	.....	.....	389	872	497	221	155	129
31	137	.....	.....	69	.....	.....	.....	860	.....	221	199	.....

NOTE.—Canal dry on days for which discharge is not given.

Monthly discharge of South San Joaquin canal near Knights Ferry, Calif., for the year Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	250	127	165	10,100
November	137	.0	47.7	2,840
December	28	.0	5.55	341
January	137	.0	55.6	3,420
February	272	.0	109	6,050
March	81	.0	19.6	1,210
April	557	.0	302	18,000
May	884	221	784	48,200
June	884	497	832	49,500
July	521	210	279	17,200
August	233	144	208	12,800
September	353	124	181	10,800
The year	884	.0	249	180,000

OAKDALE CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—On lot 2, near northwest corner of SE. ¼ SE. ¼ sec. 10, T. 1 S., R. 12 E., 1,700 feet below head gate at Goodwin dam, on Stanislaus River, and 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 3, 1914, to September 30, 1918. Also miscellaneous measurements and rough estimates for 1913.

GAGE.—Vertical staff in well on left bank about 1,700 feet below head gate, installed April 29, 1916; gage used until April 28, 1916, was a vertical staff in well on left bank about 800 feet below head gate at a different datum. Gage read by H. A. Haywood.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and sidewalls are concrete.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 5.05 feet in May and June 1918 (discharge, 217 second-feet); no flow during periods of each year.

ACCURACY.—Stage-discharge relation changed by the repairs made in canal during the fall of 1917 when the canal was shut down. Rating curves well defined. Gage read to half-tenths feet twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Oakdale irrigation district, through Burton Smith, chief engineer.

Oakdale canal diverts water from left bank of the river at Goodwin dam. The water is used for irrigation in the Oakdale irrigation district.

Discharge measurements of Oakdale canal near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 21	Charles Leidl	5.05	219
22	....do	3.00	110
Aug. 1	J. F. Kunesh	2.69	97

[1] Also known as south main canal.

Daily discharge, in second-feet, of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	.....	.....	200	206	184	95	73
2	95	.....	.....	206	206	156	90	51
3	105	.....	.....	200	206	217	95	65
4	85	.....	.....	206	211	172	95	82
5	57	11	.....	206	200	189	86	69
6	61	51	.....	206	206	134	90	65
7	61	16	.....	206	211	114	90	69
8	55	.....	.....	206	211	114	86	65
9	51	.....	.....	206	211	114	90	65
10	65	.....	.....	206	211	110	90	65
11	57	28	.....	211	217	100	90	69
12	59	45	.....	211	217	104	82	65
13	55	49	21	211	217	100	95	82
14	55	57	100	211	217	100	90	134
15	50	65	100	211	217	110	86	130
16	57	82	100	211	217	100	86	130
17	53	57	100	211	217	100	86	63
18	53	77	100	211	217	90	86	69
19	57	46	130	217	217	90	86	61
20	57	.....	145	217	217	90	86	47
21	57	.....	162	217	217	90	86	55
22	13	.....	184	217	217	95	82	57
23	.....	.....	184	217	217	90	77	55
24	.....	.....	184	217	217	82	69	53
25	.....	.....	184	217	211	82	86	53
26	.....	.....	184	217	206	86	73	47
27	.....	.....	184	217	189	86	82	49
28	.....	.....	184	211	178	90	77	49
29	.....	.....	194	206	172	86	57	49
30	.....	.....	194	206	178	90	61	51
31	.....	.....	.....	206	.....	95	82	.....

NOTE.—No flow Oct. 23, 1917 to Feb. 4, Feb. 8–10, and Feb. 23 to Apr. 12, 1918.

Monthly discharge of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	105	0	43.3	2,660
February	82	0	20.9	1,160
April	194	0	87.8	5,220
May	217	200	210	12,900
June	217	172	208	12,400
July	217	82	112	6,890
August	95	57	84.3	5,180
September	134	47	67.9	4,040
The year	217	0	69.7	50,400

CALAVERAS RIVER AT JENNY LIND, CALIF.

LOCATION.—In SE. ¼ sec. 22, T. 3 N., R. 10 E., at highway bridge on Milton road one-fourth mile southeast of Jenny Lind, Calaveras County, and 27 miles above junction with San Joaquin River. North and South forks unite about 15 miles above station.

DRAINAGE AREA.—395 square miles.

RECORDS AVAILABLE.—January 1 to June 30, 1907; December 1, 1907, to June 30, 1908; and November 1, 1908, to September 30, 1918.

GAGE.—Vertical staff in two sections on downstream end of middle pier of bridge. Read by P. F. Sinclair. Datum lowered 5 feet October 13, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet March 12 (approximate discharge, from extension of rating curve, 28,800 second-feet); no flow in river August 6 to September 5.

1907–1918: Maximum stage recorded, 14.0 feet 7 a. m. January 31, 1911 (approximate discharge, from extension of rating curve, 69,600 second-feet); stage was higher about midnight; minimum stage, dry July 22 to November 17, 1913; October 1 to 12, 1914, August 5 to September 9, 1915, August 6 to September 5, 1917, and June 1 to September 30, 1918.

DIVERSIONS.—A small quantity of water is stored at Salt Springs Valley for use in connection with dredging operations below Jenny Lind.

ACCURACY.—Stage-discharge relation changed March 12. Rating curve before change well defined below 2,000 second-feet and is extended above; curve after change poorly defined. Gage read to tenths once daily; oftener during floods. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor.

COOPERATION.—Gage-height record during the high-water season, December to June, is furnished by the United States Weather Bureau, through N. R. Taylor, meteorologist.

Discharge measurements of Calaveras River at Jenny Lind., Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	J. F. Kunesh	3.43	1.3	May 9	Charles Leidl	3.60	72
Feb. 16	do	3.93	85	July 5	do		0

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	1.3	1 3	23	40	65	137	250	72
2	1.3	1.3	23	40	65	137	250	72
3	1.3	1.3	23	40	65	137	250	72
4	1.3	1.3	23	40	65	137	250	72
5	1.3	1.3	23	40	65	137	205	72
6	1.3	1.3	23	40	65	137	205	72
7	1.3	10	23	40	137	9,820	205	72
8	1.3	10	23	40	345	2,620	165	72
9	1.3	10	23	40	137	770	165	72
10	1.3	23	23	40	137	770	165	72
11	1.3	23	23	40	137	21,400	130	72
12	1.3	23	23	40	137	28,800	130	72
13	1.3	23	40	40	137	1,960	130	47
14	1.3	23	40	40	137	1,070	130	47
15	1.3	23	40	65	137	1,070	100	47
16	1.3	23	40	65	137	1,070	100	47
17	1.3	23	40	65	137	820	100	25
18	1.3	23	40	65	3,160	1,080	100	25
19	1.3	23	40	65	945	2,460	100	25
20	1.3	23	40	65	345	2,150	100	25
21	1.3	23	40	65	345	2,150	100	13
22	1.3	23	40	65	345	1,860	100	13
23	1.3	23	40	65	2,970	1,370	100	13
24	1.3	23	40	65	1,240	820	72	13
25	1.3	23	40	65	770	660	72	5
26	1.3	23	40	65	540	400	72	5
27	1.3	23	40	65	345	400	72	5
28	1.3	23	40	65	137	295	72	5
29	1.3	23	40	65	.....	250	72	1
30	1.3	23	40	65	.....	250	72	1
31	1.3	.....	40	65	.....	250	.....	1

NOTE.—Discharge estimated Oct. 1–11 and Apr. 30 to May 31. No flow June 1 to Sept. 30.

Monthly discharge of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.3	1.3	1.30	0.0033	0.004	80.0
November	23	1.3	17.4	.044	.05	1,040
December	40	23	33.4	.085	.10	2,050
January	65	40	53.7	.136	.16	3,300
Febraury	3,160	65	473	1.20	1.25	26,300
March	28,800	137	2,750	6.96	8.02	169,000
April	250	72	134	.339	.38	7,970
May	72	1	39.6	.100	.12	2,430
The year	28,800	.0	293	.742	10.08	212,000

MOKELUMNE RIVER AND TRIBUTARIES.

NORTH FORK OF MOKELUMNE RIVER NEAR WEST POINT, CALIF.

LOCATION.—In NW. ¼ sec. 17, T. 7 N., R. 15 E., at Bruce's camp, 9½ miles northeast of West Point, on line between Calaveras and Amador counties. Blue Creek enters 1 mile below and Bear Creek 4 miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28, 1917, to September 30, 1918 (incomplete).

GAGE.—Friez water-stage recorder on right bank about 500 feet below Bruce's camp; installed October 18, 1918. Previous gage was a staff gage in two sections at same site and datum.

DISCHARGE MEASUREMENTS.—Made from cable at the gage.

CHANNEL AND CONTROL.—Channel wide; bed smooth above gage, rough and steep below gage; permanent. Banks high, not subject to overflow. Zero flow, gage height 2.4 feet.

EXTREMES OF DISCHARGE.—1917–1918: Maximum stage recorded, 12.4 feet at 7.20 p. m. June 9, 1917 (discharge, 7,290 second-feet); minimum stage recorded, 3.97 feet about November 10, 1917 (date and time unknown as clock was stopped) (discharge, 44 second-feet).

DIVERSIONS.—None.

REGULATION.—Some storage in Blue Lakes is used by Pacific Gas & Electric Co. during periods of low water to augment natural flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage height was not recorded except November 7–10, for which it was estimated from flow of other forks of Mokelumne River.

Discharge measurements of North Fork of Mokelumne River near West Point, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 19	4.27	77	May 13	8.03	1,640	May 17	7.87	1,490
May 12	7.64	1,360	14	8.92	2,490	18	8.16	1,690
12	7.59	1,260	14	8.23	1,870	July 2	5.48	322
13	8.49	2,020	15	8.49	2,070	3	5.10	230
13	8.15	1,720	16	7.74	1,390	3	5.10	231

Daily discharge, in second-feet, of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	May.	June.	July.	Aug.	Sept.
1	.....	79	93	a124	74	.....	2,220	248	101	89
2	.....	80	226	a120	.....	.....	1,690	308	108	87
3	.....	a 80	136	a116	.....	.....	1,780	224	108	86
4	.....	80	100	a112	.....	2,910	1,740	180	106	85
5	.....	79	86	a108	.....	2,800	1,780	150	105	85
6	.....	81	90	a104	.....	2,520	1,780	136	104	86
7	.....	b108	93	a100	.....	2,580	1,780	124	102	90
8	.....	b 93	88	a 96	.....	2,470	1,970	100	100	90
9	.....	b 68	81	a 92	.....	1,440	1,780	93	99	90
10	.....	b 57	a 83	a 88	.....	1,160	1,780	86	96	90
11	.....	75	a 84	a 84	.....	1,100	1,780	80	93	92
12	.....	79	86	80	.....	1,560	1,740	84	93	93
13	.....	80	90	79	.....	2,170	1,640	106	92	156
14	.....	102	88	80	.....	2,320	1,360	105	93	600
15	.....	90	94	81	.....	1,870	1,010	106	93	149
16	.....	86	98	80	.....	1,640	820	104	94	68
17	.....	88	94	81	.....	1,780	a 771	98	96	96
18	75	89	111	93	.....	1,640	a 722	93	93	118
19	75	89	121	98	.....	1,970	a 673	92	92	110
20	75	90	100	80	.....	2,020	a 625	89	94	88
21	a75	94	96	83	.....	2,070	a 576	86	99	90
22	74	90	94	78	.....	2,170	a 527	86	99	122
23	73	84	96	78	.....	2,220	478	85	94	132
24	72	83	94	75	.....	2,170	426	84	93	110
25	70	83	94	a 74	.....	1,690	362	83	92	93
26	70	83	102	74	.....	1,260	332	81	93	92
27	a71	80	147	70	.....	952	302	80	93	90
28	72	76	226	73	.....	898	280	74	93	105
29	75	81	136	76	.....	1,260	268	80	92	164
30	76	89	a132	74	.....	1,870	252	87	92	178
31	78	.....	a128	74	.....	2,120	.....	94	91	.....

a No record, discharge estimated. b No record, discharge interpolated.

NOTE.—No record Oct. 1-17, Feb. 2 to May 3, and July 8 to Sept. 30.

Monthly discharge of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 18-31	78	70	73.6	2,040
November	108	57	83.9	4,990
December	226	81	109	6,700
January	124	70	87.9	5,400
May 4-31	2,910	898	1,880	104,000
June	2,220	252	1,100	65,500
July	308	74	114	7,010
August	108	91	96.5	5,930
September	600	68	121	7,200

NOTE.—No record February to April.

MOKELUMNE RIVER NEAR CLEMENTS, CALIF.

LOCATION.—In NW. ¼ sec. 15, T. 4 N., R. 8 E., at highway bridge 1 mile north of Clements, San Joaquin County. Cosumnes River enters 19½ miles below station. North and Middle forks of Mokelumne River unite 35 miles above Clements.

DRAINAGE AREA.—631 square miles.

RECORDS AVAILABLE.—October 28, 1904, to September 30, 1918.

GAGE.—Staff in four sections at bridge; No. 1 is vertical and fastened to pile on right bank; No. 2 is inclined and is directly back of No. 1; No. 3 is vertical and bolted to middle pier near downstream end; No. 4 is vertical and bolted to left abutment near downstream end. Read by Mrs. J. S. Hodges.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Right bank is high and not subject to overflow; left bank is overflowed above stage 15 feet, for a distance of 200 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet at 5 p. m. March 12 (discharge, 8,620 second-feet); minimum stage recorded, 1.8 feet during parts of December and January (discharge, 20 second-feet).

1904–1918: Maximum stage recorded, 17.45 feet January 30, 1911 (discharge, 16,700 second-feet); minimum stage recorded, 1.8 feet part of December, 1917, and January, 1918 (discharge, 20 second-feet).

DIVERSIONS.—Several small ditches divert water for mining and irrigation above the station. Power is developed on the North Fork and part of the water is diverted outside of the drainage basin.

REGULATION.—Flow partly regulated by storage developed on the headwaters of the North Fork.

ACCURACY.—Stage-discharge relation changed February 7 and March 12. Rating curves fairly well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Mokelumne River near Clements, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. F. Kunesh	2.20	67	May 9	Charles Leidl	6.51	2,510
Feb. 15	do	2.79	231	July 6	do	2.77	248
15	do	2.76	225	Aug. 1	J. F. Kunesh	2.09	64

Daily discharge, in second-feet, of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	76	68	36	68	255	1,870	3,040	2,150	210	48	58
2	85	76	262	30	68	255	1,870	3,360	2,290	194	58	50
3	85	76	160	36	68	291	1,590	2,960	2,150	243	48	65
4	85	85	136	36	54	272	1,320	3,540	2,290	243	48	105
5	76	76	61	36	68	330	1,200	3,920	2,360	150	42	116
6	76	76	42	36	68	395	1,200	3,120	2,430	194	42	105
7	68	105	36	36	366	2,430	1,200	3,200	2,290	150	65	105
8	68	115	36	42	515	1,730	1,320	3,120	2,290	150	50	94
9	68	95	36	42	272	1,130	1,520	2,880	2,640	226	65	58
10	68	105	30	25	221	1,000	1,870	1,940	2,290	194	65	65
11	68	105	36	25	156	2,570	2,010	1,730	2,220	150	74	94
12	68	95	36	30	140	6,940	1,870	1,590	2,220	112	84	148
13	68	125	30	36	156	2,960	2,150	2,290	2,290	101	105	148
14	68	160	42	42	204	1,660	1,800	2,430	2,080	90	94	502
15	68	105	25	36	204	1,320	1,590	2,430	1,660	68	74	580
16	76	76	25	36	172	1,060	1,590	2,150	1,320	101	105	242
17	76	85	20	36	291	940	1,730	2,290	1,200	112	74	126
18	68	76	30	68	272	1,060	2,010	2,080	1,200	124	105	160
19	68	68	54	76	221	6,160	2,010	2,150	1,060	124	65	137
20	68	76	54	76	204	2,720	2,150	2,290	940	124	116	148
21	85	85	42	76	172	1,870	2,500	2,430	820	136	126	172
22	76	85	42	76	1,320	1,590	2,800	2,290	655	58	105	148
23	76	85	36	76	815	1,460	2,800	2,500	628	112	94	126
24	85	76	20	76	1,460	1,460	2,880	2,430	505	112	105	148
25	85	68	30	68	935	1,460	2,880	2,290	482	101	116	160
26	85	76	30	68	515	1,520	2,720	2,010	416	90	58	137
27	76	68	36	68	490	2,150	2,720	1,730	354	68	58	105
28	68	61	54	61	272	1,800	2,570	1,460	315	79	105	116
29	85	61	54	68	.....	1,590	2,960	1,320	296	48	116	137
30	76	54	36	68	.....	1,590	2,880	1,460	226	68	84	94
31	76	.....	30	76	.....	1,660	.....	1,870	.....	79	58	.....

Monthly discharge of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 631 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	85	68	74.7	0.118	0.14	4,590
November	160	54	85.8	.136	.15	5,110
December	262	20	52.5	.083	.10	3,230
January	76	25	51.5	.082	.09	3,170
February	1,460	54	349	.553	.58	19,400
March	6,940	255	1,730	2.74	3.16	106,000
April	2,960	1,200	2,050	3.25	3.63	122,000
May	3,920	1,320	2,400	3.80	4.38	148,000
June	2,640	226	1,470	2.33	2.60	87,500
July	243	48	129	.204	.24	7,930
August	126	42	79.1	.125	.14	4,860
September	580	50	148	.235	.26	8,810
The year	6,940	20	719	1.14	15.47	521,000

MIDDLE FORK OF MOKELUMNE RIVER AT WEST POINT, CALIF.

LOCATION.—In sec. 10, T. 6 N., R. 13 E., above highway bridge 1 mile south of West Point, Calaveras County, 1¼ miles below mouth of Bear Creek, and 3½ miles above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 9, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections, fastened to trees on right bank, 1,000 feet above bridge, read by C. H. Spink.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.56 feet night of March 11–12 (discharge, 1,150 second-feet); minimum stage recorded, 2.42 feet August 10, 11, 22, and 23 (discharge, 1.2 second-feet).

1911–1918: Maximum stage recorded, 10.0 feet at 4 p. m. January 23, 1914 (discharge, 2,556 second-feet); minimum stage recorded, 2.42 feet August 10, 11, 22, and 23, 1918 (discharge, 1.2 second-feet).

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—Mokelumne Hill and Valley Springs ditch (capacity about 6 second-feet) diverts water about 2 miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed. Rating curve well defined below 900 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Middle Fork of Mokelumne River at West Point, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 13	2.64	4.3	May 11	3.88	73
15	2.59	2.8	July 4	2.73	5.3

Daily discharge, in second-feet, of Middle Fork of Mokelumne River at West Point, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	4.3	9.5	11	8	30	169	86	27	6	1.8	1.4
2	5	4.3	18	11	8	30	160	86	26	5.5	1.6	1.4
3	5	4.3	35	10	8	29	135	86	24	5.5	1.6	1.5
4	5	4.3	8	10	8	29	120	86	24	5	1.6	1.6
5	5	4.3	9.5	9.5	8	27	112	86	22	5	1.6	1.6
6	5	9.5	11	9	39	30	105	85	22	4.7	1.6	1.8
7	5	8	11	9	61	454	120	82	20	4.3	1.6	1.8
8	4.7	6	11	9	23	135	120	92	20	4.0	1.6	1.8
9	4.7	5	11	9	18	82	135	86	19	4.0	1.6	1.8
10	4.3	4.8	11	9	14	169	143	82	18	3.6	1.2	2.1
11	3.8	7	11	9	13	514	152	73	18	3.6	1.2	2.1
12	3.8	9	11	12	12	900	152	67	18	3.3	1.6	2.1
13	3.8	7	11	13	22	253	143	65	17	3.3	1.8	15
14	3.8	6	11	14	27	169	135	61	16	3.0	1.8	34
15	4.3	6	11	12	18	127	120	57	16	3.0	2.1	9
16	4.3	6	11	11	14	105	120	53	16	3.0	2.1	9
17	4.3	6	14	11	14	105	120	50	14	2.7	2.1	8.5
18	4.3	6	11	11	22	178	120	48	14	1.8	2.1	7
19	4.3	6	11	11	18	675	120	45	13	1.8	2.1	5
20	4.3	6	11	11	20	253	120	44	12	2.1	1.8	5
21	4.3	6	11	10	105	188	120	43	11	1.8	1.5	5.5
22	4.3	6	11	10	169	160	120	42	10	1.6	1.2	9
23	4.3	6	11	10	135	143	120	40	9	1.6	1.2	8.5
24	4.3	6	11	10	169	135	120	38	8.5	1.6	1.4	7
25	4.3	6	11	9.5	71	120	120	37	8	1.6	1.4	5
26	4.3	6	18	9.5	47	276	105	36	8	1.6	1.6	5
27	4.3	6	14	9	39	209	92	36	8	1.8	1.6	5
28	4.3	6	12	9	32	169	86	36	7.5	1.8	1.6	8
29	4.3	6	12	8.5	.....	152	86	33	7	1.8	1.8	9
30	4.3	6	11	8	.....	160	86	31	6.5	1.8	1.8	7
31	4.3	.....	11	8	.....	160	.....	29	.....	1.8	1.8	.....

Monthly discharge of Middle Fork of Mokelumne River at West Point, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5	3.8	4.42	272
November	9.5	4.3	5.99	356
December	35	8	12.3	756
January	14	8	10.1	621
February	169	8	40.8	2,270
March	900	27	199	12,200
April	169	86	123	7,320
May	92	29	58.7	3,610
June	27	6.5	15.3	910
July	6	1.6	3.03	186
August	2.1	1.2	1.66	102
September	34	1.4	6.08	362
The year	900	1.2	40.0	29,000

SOUTH FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CALIF.

LOCATION.—In sec. 34, T. 6 N., R. 14 E., at Laidet ranch, 5 miles above mouth of Licking Fork, and 5 miles east of Railroad Flat, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to September 30, 1918.

GAGE.—Vertical staff fastened to alder tree on right bank 100 feet above suspension foot bridge; read by C. M. Laidet.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; seldom shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet at 8.10 a. m. March 12 (discharge, 695 second-feet); minimum stage recorded, 1.18 feet at 5.10 p. m. August 22 (discharge, 2.4 second-feet).

1911–1918: Maximum stage recorded, 6.9 feet at 4.20 p. m. January 25, 1914 (discharge, 3,330 second-feet); minumum stage recorded, 1.18 feet at 5.10 p. m. August 22, 1918 (discharge, 2.4 second-feet). (A stage of 1.10 feet on November 18, 1911, gave a discharge of 4 second-feet).

ICE.—Stage-discharge relation at times slightly affected by ice, but not during year ending September 30, 1918.

DIVERSIONS.—An irrigation and power ditch of about 2 second-feet capacity, diverts at base of Blue Mountain, above station. Some water is also used for irrigation at Laidet ranch.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation changed March 12. Rating curves coincide at 2.1 feet, well defined below 600 second-feet and is extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records for medium stages excellent; other records good.

Discharge measurements of South Fork of Mokelumne River near Railroad Flat, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 14	1.30	6.6
May 19	1.82	49
July 4	1.40	12

Daily discharge, in second-feet, of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	a6.5	41	6.5	7	25	159	99	30	a12	5	3.6
2	7	a6.5	27	7	7	28	156	99	28	12	5	2.8
3	6.5	6.5	16	7	7	31	143	99	28	11	4.3	2.8
4	7	6.5	12	7	7	30	140	94	28	12	4.3	2.8
5	7	8	11	8	7	28	123	92	26	9.5	4.3	2.6
6	7	16	10	8	36	31	119	89	24	10	4.7	2.8
7	6.5	10	10	8	61	260	128	86	24	10	a4.5	3.2
8	6.5	9	10	8	24	89	114	86	22	10	4.3	2.8
9	6.5	8	9	8	19	65	132	82	22	9	3.9	2.8
10	6.5	7	9	7	16	83	148	78	23	8	3.6	2.8
11	6	7	9	7	14	330	146	76	20	7.5	3.2	2.8
12	6	10	9	12	13	581	148	70	20	7	3.2	2.8
13	6	9.5	8.5	11	18	204	143	67	20	7	a3.2	10
14	6.5	8.5	8.5	12	17	132	123	62	20	7	a3.2	27
15	7	8	8.5	10	13	a109	119	62	20	7	3.2	15
16	7	8	8.5	10	15	86	a120	58	20	7	4.3	13
17	7	8	10	9	27	82	121	53	20	7	6	10
18	8	8	8.5	9	24	242	123	53	19	6.5	4.7	7.5
19	8	8	8	8.5	22	552	123	48	a18	6.5	4.7	6
20	7	8	8	8.5	24	253	130	48	16	6.5	3.6	5
21	6.5	8	8	8	47	165	135	48	16	6	2.8	5
22	6.5	8	8	8	89	222	148	a44	16	6	2.8	6
23	6.5	7	8	8	63	135	154	a40	16	6.5	2.8	6.5
24	6.5	6.5	7	8	63	119	a141	37	15	6.5	3.2	6.5
25	6.5	8	9	6.5	a53	119	128	36	15	6.5	2.8	6.5
26	6	8	18	6.5	a43	154	119	34	14	6.5	2.8	6.5
27	6	a8	13	6.0	a33	174	119	37	13	a6	3.6	6
28	6.5	a8	11	6.5	24	159	108	36	13	6	3.2	8
29	6.5	8	9.5	6.5	.....	a151	103	36	13	5	3.6	8
30	6.5	8	9	7.0	.....	143	103	34	13	4.3	3.6	6.5
31	6.5	.....	8	6.0	.....	162	.....	32	.....	5	3.6	.....

a No gage-height record; discharge interpolated.

Monthly discharge of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	6	6.69	411
November	16	6.5	8.15	485
December	41	7	11.3	695
January	12	6	8.02	493
February	80	7	28.3	1,570
March	581	25	159	9,780
April	159	103	131	7,800
May	99	32	61.8	3,800
June	30	13	19.7	1,170
July	12	4.3	7.64	470
August	6	2.8	3.81	234
September	27	2.6	6.45	384
The year	581	2.6	37.9	27,300

NORTH FORK OF COSUMNES RIVER NEAR ELDORADO, CALIF.

LOCATION.—In sec. 23, T. 9 N., R. 10 E., at suspension footbridge at Celio's ranch,[1] 4 miles above junction with Middle Fork, and 5 miles south of Eldorado, Eldorado County. Martinez Creek enters 1½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 13, 1911, to September 30, 1918.

GAGE.—Staff in three sections on right bank at the bridge, read by James Yates. A temporary gage was used August 13 to September 23, 1911; at same site datum 1.0 foot higher.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet March 12 (discharge, 3,720 second-feet); minimum stage recorded, 2.65 feet August 30 to September 3 (discharge, 1.4 second-feet).

1911–1918: Maximum stage recorded, 14.2 feet January 25, 1914 (discharge from extension of rating curve, about 6,930 second-feet); minimum stage recorded, 2.65 feet August 30 to September 3, 1918 (discharge, 1.4 second-feet)

ICE.—Stage-discharge relation very slightly, if ever, affected by ice.

DIVERSIONS.—The J. J. Crawford ditch (about 2 feet wide) diverts from Camp Creek, above the station. The water is used for irrigation below Placerville.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet and is extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to discharge table. Records good.

The following discharge measurement was made by J. F. Kunesh:

October 10, 1917: Gage height, 2.98 feet; discharge, 4.8 second-feet.

[1] "Kings Store" on map of Placerville quadrangle, United States Geological Survey.

Daily discharge, in second-feet, of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	6	60	29	25	99	652	418	114	8	2.3	1.4
2	a 6.5	6.5	85	29	a 27	99	a 590	a 430	99	8	2.3	1.4
3	6.5	6.5	49	29	29	99	528	a 442	99	8	2.3	1.4
4	6.5	6.5	39	29	29	99	490	454	99	6.5	2.8	1.7
5	5	6.5	34	29	29	99	490	418	99	6.5	2.8	1.7
6	6	21	29	29	130	99	472	384	99	6.5	2.3	1.7
7	a 5.5	21	a 29	29	322	1,360	a 481	384	99	5	2.3	1.7
8	a 5	21	29	29	130	490	490	352	92	a 4.6	2.3	1.7
9	5	21	a 29	29	a 95	266	695	293	85	4.3	2.0	1.7
10	5	21	a 29	29	60	1,420	785	266	a 80	4.3	2.0	2.3
11	5	18	a 29	25	a 54	528	695	a 253	a 75	4.3	a 2.0	2.0
12	5	29	29	25	49	3,720	652	240	a 70	3.4	2.0	2.3
13	5	21	29	72	99	975	695	215	a 65	3.4	2.0	11
14	5	18	25	49	215	696	610	191	60	3.4	2.0	122
15	5	a 20	25	49	85	418	490	191	49	3.4	2.0	92
16	a 5	21	25	39	72	352	a 490	191	49	3.4	2.0	39
17	5	29	29	a 39	215	352	490	191	49	3.4	2.3	21
18	5	29	34	39	130	352	472	191	44	3.4	a 2.3	14
19	6	a 29	29	39	99	2,030	490	191	39	3.4	2.3	14
20	6.5	29	a 29	34	85	1,080	528	180	39	2.8	2.3	14
21	a 6	21	29	29	122	695	610	169	39	2.5	2.3	14
22	5	21	29	29	610	610	652	169	34	2.3	2.3	18
23	5	21	29	29	266	528	695	159	29	2.3	2.0	21
24	5	21	29	a 29	695	490	695	149	25	2.3	2.0	21
25	5	a 21	a 32	29	a 432	490	695	140	21	2.8	1.7	a 18
26	5	21	a 36	29	169	454	610	a 135	21	2.8	1.7	14
27	5	21	39	29	130	1,140	490	130	18	2.8	1.7	11
28	5	21	39	29	114	925	454	130	8	a 2.6	1.7	14
29	5	21	39	29	.....	695	418	149	8	2.5	1.7	18
30	5	21	34	29	.....	695	418	130	8	2.3	1.4	21
31	5	.....	29	29	.....	652	.....	130	.....	2.3	1.4	.....

a No gage-height record; discharge interpolated.

Monthly discharge of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6.5	5	5.35	329
November	29	6	19.7	1,170
December	85	25	34.2	2,100
January	72	25	32.9	2,020
February	695	25	161	8,940
March	3,720	99	710	43,700
April	785	418	567	33,700
May	454	130	241	14,800
June	114	8	57.2	3,400
July	8	2.3	3.98	245
August	2.8	1.4	2.06	126
September	122	1.4	17.3	1,030
The year	3,720	1.4	154	112,000

COSUMNES RIVER AT MICHIGAN BAR, CALIF.

LOCATION.—In NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., at highway bridge at Michigan Bar, Sacramento County, 5½ miles southwest of Latrobe. North and Middle forks unite 12 miles above station.

DRAINAGE AREA.—525 square miles.

RECORDS AVAILABLE.—October 20, 1907, to September 30, 1918.

GAGE.—Vertical staff on downstream end of bridge pier, near left bank; read by C. B. Ruman.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and small boulders; fairly permanent. Zero flow; gage height 1.4 feet ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at noon March 12 (discharge, 11,900 second-feet); no flow September 4–11.

1907–1918: Maximum stage recorded, 11.0 feet February 21, 1917 (discharge, 22,400 second-feet); minimum stage, river dry July 25 to September 16, 1908, and September 4–11, 1918.

DIVERSIONS.—Douglas and Enterprise ditches divert from the Middle and South forks and have a combined capacity of about 50 second-feet. The water is used for power, domestic supply, and irrigation at Plymouth and vicinity. Slug Gulch ditch, having a capacity of 7 or 8 second-feet, also diverts water from the Middle Fork when prior appropriations permit. Michigan Bar canal, which has a capacity of about 50 second-feet, heads on the main Cosumnes at Musicdale Creek. No record is available showing quantity of water that is diverted.

REGULATION.—Flow is partly regulated by diversions.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Cosumnes River at Michigan Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 9	2.02	6.6
Aug. 2	1.82	2.0

Daily discharge, in second-feet, of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.5	7.5	160	39	39	210	1,160	675	210	20	2.5	0.2
2	7.5	7.5	120	39	39	210	1,160	675	192	20	2.5	.2
3	7.5	8.5	98	39	39	192	1,000	675	203	20	2.0	.1
4	7.5	9	64	39	39	192	805	635	182	14	2.0	.0
5	7.5	9	51	39	39	210	760	635	175	12	1.7	.0
6	7.5	14	44	39	64	182	760	595	175	12	1.7	.0
7	7.5	39	39	39	460	2,760	805	595	175	12	1.7	.0
8	7.5	45	39	39	345	1,340	760	525	157	12	1.7	.0
9	6.5	29	37	39	192	760	950	560	145	12	1.7	.0
10	6	29	37	39	132	2,280	1,340	460	120	9	1.7	.0
11	6	28	35	39	102	3,700	1,160	400	120	9	1.7	.0
12	6	29	34	39	98	10,800	1,160	400	120	9	1.7	.2
13	6	37	34	64	109	2,760	1,050	400	120	9	1.7	10
14	6	34	31	89	230	1,410	1,050	400	98	6	1.7	157
15	6	29	29	80	246	1,050	850	400	87	6	1.5	175
16	6	29	39	64	140	805	850	372	80	6	1.5	61
17	6	29	39	64	595	675	850	345	80	6	1.1	45
18	6	29	39	59	430	850	850	345	80	6	1.1	31
19	6	29	49	51	210	7,530	850	335	67	6	1.1	24
20	6	29	39	51	175	2,760	850	295	64	6	1.1	20
21	9	29	39	51	295	1,620	950	295	58	6	1.1	20
22	9	29	39	49	1,860	1,340	850	295	58	4.6	1.5	15
23	9	29	39	51	1,410	1,160	850	295	51	3.3	1.5	14
24	7.5	29	39	51	1,550	1,050	850	250	51	3.3	1.7	17
25	7.5	29	39	51	675	1,000	850	250	51	3.3	1.7	20
26	7.5	29	41	51	430	1,000	718	250	39	3.3	1.5	20
27	7.5	29	58	39	320	2,190	675	250	29	3.3	1.5	20
28	7.5	29	64	39	230	1,480	675	250	29	3.3	1.2	20
29	7.5	29	58	39	.....	1,220	675	234	22	3.0	.5	24
30	7.5	51	45	39	.....	1,160	718	210	20	2.5	.5	29
31	7.5	.....	39	39	.....	1,160	.....	210	.....	2.5	.5	.....

Monthly discharge of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	6	7.08	435
November	51	7.5	27.0	1,610
December	160	29	50.2	3,090
January	89	39	48.0	2,950
February	1,860	39	375	20,800
March	10,800	182	1,780	109,000
April	1,340	675	894	53,200
May	675	210	404	24,800
June	210	20	102	6,070
July	20	2.5	8.08	497
August	2.5	.5	1.50	92.2
September	175	.0	24.1	1,430
The year	10,800	.0	310	225,000

GOOSE LAKE BASIN.

DREWS CREEK RESERVOIR NEAR LAKEVIEW, OREG.

LOCATION.—Dam is in sec. 5, T. 40 S., R. 18 E.; reservoir extends upstream about 10 miles.

RECORDS AVAILABLE.—February 26, 1913, to September 30, 1918; occasional readings until February 6, 1916; after that date readings practically every day.

GAGE.—Gage face attached to plank on upstream face of dam since 1915. Previous readings obtained by measuring down from the floor of gate house. Gage heights refer to a datum level with lowest contour of reservoir. Gage reader, James McShane.

OUTLETS.—A tunnel with sill at elevation 16.3 feet and a blow-out pipe in center of dam at bottom.

EXTREMES OF STAGE.—Maximum stage recorded during year, 45.0 feet April 21 to 27 (quantity stored, 27,400 acre-feet); minimum stage recorded, 30.8 feet Sept. 29–30 (quantity stored, 3,970 acre-feet).

1913–1918: Maximum stage recorded, 53.4 feet April 18 to 20, 1914 (quantity stored, 55,500 acre-feet.

ACCURACY.—Prior to 1914 the monthly estimates of increase or decrease of volume of storage are only approximate, as the readings of water stage are very rough, but the error for the entire year is probably not great. Beginning in 1914 the results are good.

The following readings, at the end of each month, have been used in correcting the observed flow of Drews Creek below the dam:

Readings used in correcting observed flow of Drews Creek below dam.

Date.	Gage height (feet).	Storage (acre-feet).	Loss or gain during month (acre-feet).	Date.	Gage height (feet).	Storage (acre-feet).	Loss or gain during month (acre-feet).
Oct. 31	38.00	12,300	−1,190	Apr. 30	44.90	27,140	+4,960
Nov. 30	37.70	11,830	− 470	May 31	43.40	23,300	−3,840
Dec. 31	37.80	11,990	+ 160	June 30	39.78	15,400	−7,900
Jan. 31	38.20	12,640	+ 650	July 31	35.62	8,820	−6,580
Feb. 28	38.80	13,860	+1,220	Aug. 31	32.50	5,340	−3,480
Mar. 31	42.95	22,180	+8,320	Sept. 30	30.86	3,970	−1,370

DREWS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SE. ¼ sec. 4, T. 40 S., R. 18 E., at highway bridge half a mile below mouth of Willow Creek, 1 mile below Drews Creek dam, and 18 miles southwest of Lakeview, Lake County.

DRAINAGE AREA.—211 square miles.

RECORDS AVAILABLE.—January 16, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank, 100 yards upstream from highway bridge; installed May 18, 1918. Recorder on left bank just below bridge used March 19, 1912, to May 17, 1918, referred to a vertical staff on the highway bridge, installed March 1, 1910. Gage inspected by James McShane. Inclined staff at station No. 1, at the dam site a mile above present gage, used January 16 to May 31, 1909, and vertical staff at station No. 2, at a dump-car bridge 100 feet below the dam site, November 20, 1909, to February 28, 1910.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Control about 150 feet below gage; rock and practically permanent; bed composed of gravel and sand, shifts slightly; drift and growth of aquatic plants may collect on control occasionally, affecting stage-discharge relation. One channel at all stages. Willows on right bank.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder at new site, 0.83 foot at 6 p. m. June 19 (discharge, 20 second-feet); minimum stage, from water-stage recorder, 0.44 foot September 16–28 (discharge 1.0 second-feet); discharge may have gone a little lower than this during the winter.

1900–1917: Maximum stage recorded, 8.3 feet January 16, 1909, on original gage (discharge, 2,730 second-feet). Gage height estimated as 12 to 13 feet on gage No. 2 (gage washed out) on evenings of March 1 and 2, 1910 (discharge probably about 3,000 second-feet). Creek dry at times prior to construction of reservoir.

ICE.—Stage-discharge relation affiected by ice during the coldest weather, generally for one to two months.

DIVERSIONS.—The North Drews canal of the Goose Lake Valley Irrigation Co. diverts water past the station; record is kept of its discharge and this is added to secure the total run-off from the creek..

REGULATION.—Since the last part of 1912, water has been stored in the reservoir of the Goose Lake Valley Irrigation Co. just above the station. A neglible quantity of water was stored prior to that time.

The run-off records when corrected for storage are often negative during the summer as the discharge into the reservoir becomes too small to offset the evaporation losses.

ACCURACY.—Stage-discharge relation unstable at old site used up to May 19; much better but apparently affected by growth of aquatic plants at new site. Two fairly well defined rating curves used for May 20 to 29 and June 12 to September 30; shifting-control method May 30 to June 11. Operation of recorder satisfactory only part of time; one staff gage reading daily, used balance of year gives satisfactory results. Daily discharge ascertained by applying to rating table the mean daily gage height obtained from the daily gage reading or by inspecting the recorder graph.. Discharge for October 1 to May 19, obtained from weir data furnished by Goose Lake Valley Irrigation Co. Record fair April to July, poor during the rest of year; but owing to the small quantities involved the accuracy of determination of the total run-off, including North Drews canal, is not seriously affected.

Discharge measurements of Drews Creek near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	F. F. Henshaw	2.00	7.7	June 16	R. C. Briggs	0.58	6.1
May 20	R. C. Briggs	a.56	6.8	Aug. 5	do	.50	2.5

a On new gage: old gage read 1.96 feet.

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		6	8	6	10	2.5	2.0
2		6	8	8	12	2.5	2.0
3		6	8	8	12	2.5	2.0
4		6	8	8	12	2.5	2.0
5		6	8	8	12	2.5	2.0
6		6	8	8	12	2.5	2.0
7		6	8	8	12	2.5	1.5
8		6	8	8	14	2.5	1.5
9		6	8	8	12	2.5	1.5
10		7	8	10	10	2.5	1.5
11		7	8	10	10	2.5	1.5
12		7	7	12	10	2.5	1.5
13		7	7	12	10	2.5	1.5
14		7	7	11	10	2.5	1.5
15		7	7	9	10	2.5	1.5
16		7	7	7	14	2.5	1.0
17		7	7	6	12	2.5	1.0
18		8	7	6	12	2.5	1.0
19		8	7	15	12	2.5	1.0
20		8	7	14	12	2.5	1.0
21		8	8	12	14	2.5	1.0
22		8	10	10	14	2.5	1.0
23		8	7	10	14	2.5	1.0
24	3	8	7	9	13	2.5	1.0
25	3	8	7	7.5	5.5	2.0	1.0
26	3	8	7	6.0	13	2.0	1.0
27	3	8	7	5.5	8.5	2.0	1.0
28	4	8	10	5.5	3.3	2.0	1.0
29	4	8	24	5.5	2.5	2.0	1.2
30	4	8	16	5.5	2.5	2.0	1.2
31	5	.....	16	.....	2.5	2.0	.....

NOTE.—Mean discharge estimated from records on weirs maintained by the Goose Lake Valley Irrigation Co. below the dam as follows: Oct. 1–10, 2.5 second-feet; Oct. 11–31, 2.0 second-feet; Nov. 1–10, 1.5 second-feet; Nov. 11 to February 4, 1.0 second-feet; Feb. 5, 1.5 second-feet; Feb. 6, 3.0 second-feet; Feb. 7 to Mar. 15, 1.5 second-feet, Mar. 16–23, 2.0 second-feet; Mar. 24 to May 19, as in table.

Monthly discharge of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	2.2	135
November	.....	.....	1.2	71
December	.....	.....	1.0	61
January	.....	.....	1.0	61
February	.....	.....	1.5	83
March	5	.....	2.2	135
April	8	6	7.13	424
May	24	7	8.71	536
June	15	5.5	8.62	513
July	14	2.5	10.4	640
August	2.5	2.0	2.39	147
September	2.0	1.0	1.36	81
The year	24	.....	3.98	2,890

NOTE.—Total run-off of Drews Creek, including North Drews canal and allowing for decrease in storage in reservoir during year, was 13,800 acre-feet.

NORTH DREWS CANAL NEAR LAKEVIEW, OREG.

LOCATION.—In SE. ¼ sec. 4, T. 40 S., R. 18 E., nearly opposite station on Drews Creek, 1½ miles below intake of canal at Drews Creek dam and 18 miles southwest of Lakeview, Lake County.

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1918.

GAGE.—Vertical staff on right side of canal opposite bridge, on Drews Creek; installed May 20, 1918. A gage in flume at station 107, about half a mile below, was used from 1914 to May 19, 1918. Gage reader, James McShane.

DISCHARGE MEASUREMENTS.—Made from wagon bridge one-fourth mile above gage or by wading.

CHANNEL AND CONTROL.—Canal excavated in earth and rock; control is a rock cut, a few hundred feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and during period 1914 to 1918, 3.52 feet June 16–18 (discharge, 143 second-feet). Canal dry at times.

ACCURACY.—Stage-discharge relation practically permanent at new station, unstable at old station, owing to growth of aquatic plants. Fairly well defined rating curve used for old gage April 23 to May 19, shifting-control method used October to December. Curve for new gage is well defined; Gage read to half-tenths daily thereafter. Daily discharge ascertained by applying daily gage heights to rating table. Results for new gage excellent, for old gage fair.

North Drews canal diverts water from Drews Creek at reservoir dam in SE. ¼ sec. 5 for irrigating land north of the creek on the west side of Goose Lake Valley.

Discharge measurements of North Drews canal near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	Henshaw and Briggs...	0.92	20.6	June 16	R. C. Briggs.....	3.51	144
May 20	R. C. Briggs.....	[a] 2.22	56	Aug. 5	.....do.....	2.18	51.4

[a] On new gage, old gage read 1.90 feet.

Daily discharge, in second-feet, of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	29	14	16	.....	23	75	111	37	35
2	29	14	16	.....	32	75	111	37	26
3	29	14	16	.....	32	75	111	53	26
4	29	14	16	.....	32	75	111	50	26
5	29	14	16	.....	32	75	111	50	26
6	29	14	.....	.....	32	75	111	50	26
7	14	14	.....	.....	32	75	111	50	26
8	14	14	.....	.....	32	75	111	50	26
9	14	14	.....	.....	23	75	111	50	26
10	14	14	.....	.....	23	75	90	50	26
11	14	14	.....	.....	23	75	82	50	26
12	14	14	.....	.....	23	75	82	50	26
13	14	14	.....	.....	40	119	82	43	26
14	14	14	.....	.....	46	127	82	43	26
15	14	14	.....	.....	46	127	75	43	26
16	14	14	.....	.....	46	143	82	43	14
17	14	14	.....	.....	46	143	75	43	14
18	14	14	.....	.....	46	143	75	43	14
19	14	14	.....	.....	46	83	68	43	14
20	14	14	.....	.....	53	75	58	46	14
21	14	14	.....	.....	69	75	58	46	14
22	14	14	.....	.....	56	103	53	53	14
23	14	14	.....	32	50	103	53	53	14
24	14	14	.....	17	50	127	39	53	14
25	14	14	.....	23	56	143	39	50	14
26	14	14	.....	23	69	143	72	50	14
27	14	14	.....	22	69	143	82	50	14
28	14	14	.....	22	69	143	63	50	14
29	14	14	.....	22	69	160	53	50	14
30	14	14	.....	22	69	160	53	39	14
31	14	.....	.....	.....	75	.....	37	39	.....

Monthly discharge of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	29	14	16.9	1,040
November	14	14	14.0	833
December 1–5	.....	.....	16.0	159
April 23–30	.....	.....	2.29	363
May	75	23	45.5	2,800
June	160	75	105	6,250
July	111	37	79.1	4,860
August	53	37	47.0	2,890
September	35	14	20.3	1,210
The year	.....	.....	.....	20,400

NOTE.—Canal dry Dec. 6 to Apr. 22.

COTTONWOOD CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 38 S., R. 19 E., half a mile below dam site of proposed storage reservoir, near edge of valley, and 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—30 square miles.

RECORDS AVAILABLE.—November 22, 1908, to September 30, 1918.

GAGE.—Vertical staff on left bank; read once daily by Peter Segner. From November 22, 1908, to January 18, 1909, a gage just above a weir, one-fourth mile below the dam site, was used.

DISCHARGE MEASUREMENTS.—Made from a footbridge 40 feet below present gage or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of clean gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.9 feet March 25 (discharge, 139 second-feet); minimum stage recorded, 0.05 foot August 31 to September 3 (discharge, 0.2 second-feet).

1908–1918: Maximum stage recorded, 3.4 feet November 23, 1909 (discharge, 337 second-feet); minimum discharge, that of 1918.

ICE.—Stage-discharge relation seriously affected by ice during February; flow estimated.

DIVERSIONS.—Some water diverted during 1918 for irrigation in a valley above the station.

ACCURACY.—Stage-discharge relation for stages below 0.7 foot, changed during high water about March 25; rating curve for first period well defined, for second period poorly defined at low-water gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good for October to December, April and May, poor during the rest of the year on account of diurnal fluctuation and uncertainty of rating.

Discharge measurements of Cottonwood Creek near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 13	Hardman and Henderson[a]	0.32	5.6
Apr. 27	F. F. Henshaw	.73	31.2
June 16	R. C. Briggs	.26	2.9

[a] Employees of Goose Lake Valley Irrigation Co.

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.7	6.5	14.0	4.6	16.0	43.0	28.0	7.0	1.2	1.2	.2
2	2.7	6.5	16.0	4.6	19.0	39.0	32.0	7.0	1.2	1.2	.2
3	2.7	6.5	16.0	4.6	16.0	39.0	28.0	7.0	1.2	1.2	.2
4	2.7	6.5	16,0	6.5	16.0	35.0	28.0	7.0	1.2	1.2	.5
5	2.7	6.5	19.0	6.5	14.0	28.0	32.0	7.0	1.2	1.2	.5
6	2.7	6.5	16.0	6.5	14.0	24.0	28.0	7.0	1.2	1.2	.5
7	2.7	6.5	16.0	6.5	16.0	21.0	28.0	7.0	1.2	1.2	.5
8	2.7	4.6	16.0	6.5	16.0	43.0	21.0	7.0	1.2	1.2	.5
9	2.7	4.6	16.0	11.0	19.0	87.0	21.0	7.0	1.2	1.2	.5
10	2.7	4.6	14.0	11.0	16.0	74.0	21.0	5.0	1.2	1.2	1.2
11	2.7	6.5	14.0	19.0	11.0	69.0	18.0	5.0	2.0	1.2	1.2
12	2.7	6.5	6.5	22.0	8.8	47.0	18.0	5.0	2.0	1.2	1.2
13	2.7	6.5	6.5	22.0	6.5	43.0	18.0	5.0	2.0	2.0	2.0
14	2.7	8.8	6.5	16.0	6.8	35.0	15.0	5.0	2.0	2.0	2.0
15	4.6	8.8	4.6	11.0	11.0	35.0	15.0	5.0	2.0	2.0	2.0
16	4.6	8.8	4.6	11.0	14.0	32.0	15.0	5.0	2.0	2.0	2.0
17	4.6	11.0	6.5	11.0	14.0	28.0	15.0	5.0	2.0	2.0	2.0
18	4.6	11.0	6.5	14.0	16.0	28.0	15.0	5.0	2.0	2.0	2.0
19	4.6	11.0	6.5	16.0	19.0	35.0	15.0	3.5	2.0	2.0	2.0
20	4.6	11.0	6.5	16.0	87.0	43.0	15.0	3.5	2.0	2.0	2.0
21	4.6	14.0	6.5	14.0	92.0	43.0	12.0	3.5	2.0	2.0	2.0
22	4.6	14.0	8.8	14.0	97.0	43.0	12.0	3.5	2.0	2.0	2.0
23	4.6	11.0	8.8	11.0	97.0	35.0	9.0	3.5	2.0	2.0	2.0
24	4.6	11.0	8.8	11.0	102.0	39.0	9.0	3.5	2.0	2.0	2.0
25	2.7	11.0	8.8	14.0	139.0	35.0	9.0	3.5	2.0	2.0	2.0
26	2.7	11.0	8.8	16.0	97.0	35.0	9.0	3.5	2.0	1.2	2.0
27	2.7	11.0	8.8	16.0	102.0	32.0	9.0	2.0	2.0	1.2	3.5
28	2.7	14.0	6.5	14.0	102.0	28.0	9.0	1.2	2.0	.5	2.0
29	4.6	14.0	6.5	11.0	43.0	32.0	9.0	1.2	2.0	.5	2.0
30	6.5	14.0	6.5	11.0	69.0	32.0	9.0	1.2	1.2	.5	2.0
31	6.5	.....	6.5	14.0	60.0	.....	9.0	.....	1.2	.2	.....

NOTE.—Stage-discharge affected by ice during February; discharge estimated, 10 second-feet.

Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6.5	2.7	3.62	223
November	14	4.6	9.14	544
December	19	4.6	10.1	621
January	22	4.6	12.0	738
February	.....	.....	a10.0	555
March	139	6.5	43.8	2,690
April	87	21	39.4	2,340
May	32	9.0	17.1	1,051
June	7.0	1.2	4.72	281
July	2.0	1.2	1.69	104
August	2.0	.2	1.44	89
September	3.5	.2	1.49	89
The year	139	.2	12.9	9,320

a Estimated.

SACRAMENTO RIVER BASIN.

MAIN STREAM.

SACRAMENTO RIVER AT CASTELLA, CALIF.

LOCATION.—In sec. 22, T. 38 N., R. 4 W., at private highway bridge at Castella, Shasta County, half a mile below mouth of Castle Creek.

DRAINAGE AREA.—257 square miles.

RECORDS AVAILABLE.—October 15, 1910, to April 20, 1918, when station was discontinued.

GAGE.—Vertical staff on downstream end of bridge pier near right bank; read by A. H. Smythe.

DISCHARGE MEASUREMENTS.—Made from bridge at Sweetbrier camp, half a mile below gage, the section being more satisfactory than the one at the highway bridge where early measurements were made.

CHANNEL AND CONTROL.—Small boulders; rough; fairly permanent.

EXTREMES OF DISCHARGE.—1910–1918: Maximum stage recorded, 13.7 feet at 5.50 a. m. January 2, 1914 (discharge, from extension of rating curve, about 16,000 second-feet); minimum stage recorded, 2.05 feet September 19 to 30, 1917 (discharge, 108 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 3,500 second-feet and is extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by A. H. Smythe.

The following discharge measurement was made by J. F. Kunesh:
September 17, 1918: gage-height, 2.20 feet; discharge, 164 second-feet.

Daily discharge, in second-feet, of Sacramento River at Castella, Calif., for the period Feb. 12 to Apr. 20, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1	.....	440	1,260	11	.....	485	1,260	21	350	1,260	.....
2	.....	485	800	12	485	590	1,260	22	440	1,260	.....
3	.....	485	800	13	485	485	1,060	23	590	1,260	.....
4	.....	485	800	14	395	440	800	24	485	1,260	.....
5	.....	440	720	15	395	485	800	25	440	1,260	.....
6	.....	440	800	16	395	485	800	26	440	1,260	.....
7	.....	440	800	17	395	1,260	800	27	440	1,060	.....
8	.....	440	1,260	18	395	4,860	800	28	440	1,060	.....
9	.....	440	1,260	19	310	2,150	800	29	.....	880	.....
10	.....	440	1,260	20	310	1,260	800	30	.....	1,260	.....
								31	.....	1,260	.....

NOTE.—Gage not read Oct. 1 to Feb. 11.

Monthly discharge of Sacramento River at Castella, Calif., for the period Feb. 12 to Apr. 20, 1918.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
February 12–28	590	310	423	.....	.....	14,300
March	4,860	440	971	3.78	4.36	59,700
April 1–20	1,260	720	947	.....	.....	37,600
The year	.....	.....	.....	.....	.....	112,000

SACRAMENTO RIVER NEAR RED BLUFF, CALIF.

LOCATION.—In lot 4, sec. 34, T. 28 N., R. 3 W., at lower end of Iron Canyon, 3 miles below proposed Iron Canyon dam site and 4 miles northeast of Red Bluff, Tehama County. Paines Creek enters 3 miles above and Antelope Creek 7 miles below station.

DRAINAGE AREA.—9,300 square miles, not including the drainage area of Goose Lake—1,090 square miles—which belongs naturally in Pit River basin but has contributed no water except for a short time in 1869, and for more than two hours during a severe storm from the north in 1881, when the lake overflowed to North Fork of Pit River. Previously published figures of discharge in second-feet per square mile and run-off in depth in inches, based on the drainage area including Goose Lake, should be used with caution because of the large noncontributing area.

RECORDS AVAILABLE.—January 28, 1902, to September 30, 1918. In 1879 the State engineer and in 1893 and 1894 the commissioner of public works made measurements at this point. From April 30, 1895, to June 30, 1902, a gaging station was maintained at Jellys Ferry, 12 miles above Red Bluff.

GAGE.—Staff in seven sections on left bank; read by Richard Groebe. Several gages have been used at this station, but all observations have been reduced to the present datum. The United States Weather Bureau gage at Red Bluff has occasionally been used for short periods.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above the gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 8.40 a. m., March 19 (discharge, 54,400 second-feet); minimum stage recorded, 0.6 foot August 30 to September 2 (discharge, 3,510 second-feet).

1902–1918: Maximum stage recorded, 35.2 feet February 3, 1909 (discharge, 278,000 second-feet); minimum stage recorded, 0.6 foot August 30 to September 2, 1918 (discharge, 3,510 second-feet).

DIVERSIONS.—The Anderson-Cottonwood canal diverts from the Sacramento River at Redding. This canal started to divert water in 1918. A small amount of water is diverted from some of the minor tributaries for irrigation.

REGULATION.—No storage of any importance has been developed in the drainage area above the station.

ACCURACY.—Stage-discharge relation permament. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Sacramento River near Red Bluff, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 22	0.70	3,690
July 22	.70	3,700

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,490	4,490	15,100	6,350	5,370	8,600	17,000	8,300	5,140	4,080	3,690	3,510
2	4,490	4,490	8,000	6,090	5,370	8,300	15,500	8,000	5,140	3,880	3,690	3,510
3	4,490	4,700	6,350	5,840	5,370	8,300	14,000	7,710	5,140	3,880	3,690	3,510
4	4,280	5,140	5,840	5,840	5,370	8,000	12,900	7,710	5,140	3,880	3,690	3,510
5	4,280	5,140	5,600	5,600	5,840	8,910	12,200	7,710	4,920	3,880	3,690	3,510
6	4,280	5,370	5,370	5,600	14,400	7,710	11,500	7,430	4,920	3,880	3,690	3,690
7	4,280	5,140	5,370	5,600	28,500	8,000	11,500	7,150	4,700	3,880	3,690	3,690
8	4,280	4,920	5,370	5,600	16,200	8,600	12,200	7,150	4,700	3,880	3,690	3,880
9	4,280	4,920	5,140	5,370	12,200	8,600	19,000	7,150	4,700	3,880	3,690	3,880
10	4,280	4,920	5,140	5,370	9,540	8,300	22,300	7,150	4,700	3,880	3,690	3,880
11	4,280	4,920	5,140	5,370	8,300	17,000	18,200	7,150	4,700	3,880	3,690	3,880
12	4,280	6,610	5,140	5,600	7,710	18,200	16,600	6,880	4,700	3,880	3,510	3,880
13	4,280	5,840	5,140	5,600	8,600	18,200	16,600	6,610	4,700	3,880	3,690	4,280
14	4,280	5,600	5,140	7,150	8,910	13,300	14,800	6,610	4,490	3,880	3,690	12,900
15	4,280	5,370	5,140	7,150	8,300	11,500	14,400	6,350	4,490	3,880	3,690	6,090
16	4,280	5,140	5,140	6,350	7,710	10,900	12,200	6,350	4,490	3,880	3,880	4,920
17	4,280	4,920	5,140	6,090	11,500	10,500	11,500	6,350	4,490	3,690	3,880	4,490
18	4,280	4,920	5,140	6,090	9,540	25,400	11,200	6,090	4,490	3,690	3,880	4,280
19	4,490	4,920	5,140	6,350	8,300	52,100	10,900	6,090	4,490	3,690	3,880	4,280
20	4,490	4,920	5,140	6,090	7,710	29,400	10,500	6,090	4,280	3,690	3,880	4,280
21	4,490	4,920	5,140	5,840	7,710	22,300	10,200	6,090	4,280	3,690	3,880	4,280
22	4,490	4,920	5,140	5,600	8,910	18,600	10,500	6,090	4,280	3,690	3,880	4,280
23	4,490	4,920	5,140	5,600	12,200	19,000	10,200	5,840	4,280	3,690	3,880	4,490
24	4,490	4,920	5,140	5,600	19,800	19,400	10,200	5,600	4,280	3,690	3,690	4,490
25	4,490	4,920	6,500	5,600	14,400	24,900	10,200	5,600	4,280	3,690	3,690	4,280
26	4,490	4,920	12,900	5,600	11,500	31,800	9,540	5,600	4,280	3,690	3,690	4,280
27	4,490	4,920	17,000	5,370	9,880	25,800	9,220	5,600	4,280	3,690	3,510	4,280
28	4,490	4,920	10,200	5,370	9,220	22,300	8,910	5,370	4,280	3,690	3,510	4,280
29	4,490	5,140	8,300	5,370	.....	20,600	8,600	5,370	4,080	3,690	3,510	4,490
30	4,490	6,350	7,150	5,370	.....	19,400	8,300	5,370	4,080	3,690	3,510	4,490
31	4,490	.....	6,610	5,370	.....	17,800	.....	5,140	.....	3,690	3,510	.....

NOTE.—Gage not read Dec. 14-25; discharge estimated from record of flow of Pit River near Ydalpom.

Monthly discharge of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,490	4,280	4,390	270,000
November	6,610	4,490	5,110	304,000
December	17,000	5,140	6,710	413,000
January	7,150	5,370	5,800	357,000
February	28,500	5,370	10,300	572,000
March	52,100	7,710	17,200	1,060,000
April	22,300	8,300	12,700	756,000
May	8,300	5,140	6,510	400,000
June	5,140	4,080	4,560	271,000
July	4,080	3,690	3,790	233,000
August	3,880	3,510	3,700	228,000
September	12,900	3,510	4,450	265,000
The year	52,100	3,510	7,080	5,130,000

PIT RIVER AND TRIBUTARIES.

PIT RIVER AT HENDERSON, CALIF.

LOCATION.—In sec. 36, T. 37 N., R. 1 W., at Big Bend ferry, one-fourth mile above Henderson, Shasta County. Nelson Creek enters half a mile above and Kosk Creek 1 mile below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder 50 feet below vertical staff fastened to an alder tree on left bank about 100 feet above ferry; the gages do not read exactly the same on account of the slope of the water surface. Staff gage is the original gage. From December 28, 1912, to September 21, 1917, record is from a Gurley printing water-stage recorder. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet downstream from water-stage recorder.

CHANNEL AND CONTROL.—Rough; boulders and coarse gravel; fairly permanent. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.6 feet at 3 a. m. March 27 (discharge, 6,400 second-feet); minimum stage from water-stage recorder, 0.43 foot during afternoon September 4 (discharge, 2,190 second-feet).

1910–1918: Maximum stage from water-stage recorder, 5.39 feet at 8 p. m. April 25, 1917 (discharge, 13,600 second-feet); minimum stage from water-stage recorder 0.43 foot afternoon of September 4, 1918 (discharge, 2,190 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No information.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Pit River at Henderson, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 25	0.50	2,270
25	.50	2,310

Daily discharge, in second-feet, of Pit River at Henderson, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,590	2,750	3,100	2,750	2,580	2,920	4,450	2,920	2,440	2,280	2,280	2,280
2	2,590	2,750	2,920	2,750	2,750	2,920	4,250	2,920	2,440	2,280	2,280	2,220
3	2,590	2,750	2,920	2,750	2,750	2,920	4,050	2,750	2,440	2,220	2,280	2,220
4	2,590	2,750	2,920	2,750	2,750	2,920	3,660	2,750	2,440	2,280	2,280	2,220
5	2,590	2,750	2,750	2,750	2,750	2,920	3,660	2,750	2,440	2,440	2,280	2,220
6	2,590	2,750	2,750	2,750	3,100	2,920	3,470	2,750	2,440	2,440	2,280	2,280
7	2,590	2,750	2,750	2,750	3,250	2,920	3,470	2,750	2,440	2,280	2,280	2,280
8	2,590	2,750	2,750	2,750	2,280	2,920	3,470	2,580	2,440	2,440	2,280	2,280
9	2,590	2,750	2,750	2,750	3,100	2,920	3,550	2,580	2,280	2,440	2,280	2,280
10	2,590	2,750	2,750	2,750	3,100	3,100	4,050	2,580	2,280	2,280	2,280	2,280
11	2,590	2,920	2,750	2,750	2,920	3,280	3,550	2,750	2,440	2,440	2,280	2,280
12	2,590	2,750	2,750	2,750	2,920	3,470	3,550	2,750	2,440	2,440	2,280	2,440
13	2,590	2,750	2,750	2,750	2,920	3,470	3,550	2,750	2,440	2,440	2,280	2,440
14	2,590	2,750	2,750	2,750	3,100	3,660	3,550	2,750	2,440	2,440	2,280	2,500
15	2,590	2,750	2,750	2,750	2,920	3,280	3,660	2,750	2,440	2,440	2,280	2,440
16	2,590	2,750	2,750	2,750	3,100	3,280	3,470	2,750	2,280	2,440	2,440	2,440
17	2,590	2,750	2,750	2,750	2,920	3,470	3,470	2,750	2,280	2,280	2,440	2,440
18	2,590	2,750	2,750	2,750	2,920	3,550	3,280	2,750	2,440	2,280	2,440	2,500
19	2,590	2,750	2,920	2,750	2,920	4,050	3,280	2,750	2,440	2,220	2,440	2,500
20	2,590	2,750	2,920	2,750	2,920	4,250	3,280	2,560	2,440	2,220	2,280	2,500
21	2,590	2,750	2,920	2,750	2,750	4,250	3,100	2,500	2,440	2,220	2,280	2,500
22	2,590	2,750	2,920	2,750	2,920	4,060	3,100	2,500	2,440	2,280	2,280	2,500
23	2,750	2,750	2,920	2,750	3,100	4,060	3,100	2,500	2,440	2,280	2,280	2,500
24	2,590	2,750	2,920	2,750	3,100	4,450	3,100	2,500	2,440	2,280	2,280	2,500
25	2,750	2,750	2,920	2,750	3,100	4,670	3,100	2,440	2,440	2,280	2,280	2,500
26	2,750	2,750	3,100	2,750	3,100	5,720	3,100	2,440	2,280	2,280	2,280	2,500
27	2,750	2,750	2,920	2,750	3,100	6,170	3,100	2,500	2,280	2,280	2,280	2,500
28	2,750	2,920	2,920	2,750	2,920	5,940	3,100	2,560	2,280	2,280	2,280	2,440
29	2,750	3,100	2,920	2,750	.....	5,500	2,920	2,500	2,280	2,280	2,280	2,440
30	2,750	3,100	2,920	2,750	.....	5,060	2,920	2,500	2,280	2,220	2,280	2,440
31	2,750	.....	2,920	2,750	.....	4,670	.....	2,560	.....	2,280	2,280	.....

NOTE.—No gage-height record Oct. 6-12 and May 12-17; discharge interpolated.

Monthly discharge of Pit River at Henderson, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,750	2,590	2,630	162,000
November	3,100	2,750	2,780	165,000
December	3,100	2,750	2,850	175,000
January	2,750	2,750	2,750	169,000
February	3,280	2,590	2,970	165,000
March	6,170	2,920	3,920	241,000
April	4,450	2,920	3,500	208,000
May	2,920	2,440	2,670	164,000
June	2,440	2,290	2,400	143,000
July	2,440	2,220	2,330	143,000
August	2,440	2,290	2,310	142,000
September	2,590	2,220	2,430	145,000
The year	6,170	2,220	2,790	2,020,000

PIT RIVER AT YDALPOM, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 34 N., R. 3 W., at Silverthorne Ferry, 1½ miles southwest of Ydalpom, Shasta County, and 7½ miles above junction with Sacramento River. Squaw Creek enters half a mile above and McCloud River 4 miles below station.

DRAINAGE AREA.[1]—5,260 square miles, not including drainage area of Goose Lake.

RECORDS AVAILABLE.—November 16, 1910, to September 30, 1918.

GAGE.—Vertical staff in two sections fastened to an ash tree on left bank 350 feet below ferry; read by M. D. Rodrigue.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above ferry cable.

CHANNEL AND CONTROL.—Gravel and sand; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.8 feet at 8 a. m. March 25 (discharge, 15,000 second-feet); minimum stage recorded, 2.52 feet at 11.30 a. m. July 23 (discharge, 2,410 second-feet).

1910–1918: Maximum stage recorded, 18.2 feet December 31, 1913 (discharge, from extension of rating curve, about 47,000 second-feet); minimum stage recorded, 2.52 feet at 11.30 a. m. July 23, 1918 (discharge, 2,410 second-feet).

DIVERSIONS.—A small quantity of water, used for irrigation, is diverted from the main stream and tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 35,000 second-feet and extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Discharge measurements of Pit River at Ydalpom, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 23	Charles Leidl	2.52	2,460
Sept. 18	J. F. Kunesh	2.68	2,590

[1] See drainage area of Sacramento River near Red Bluff.

Daily discharge, in second-feet, of Pit River at Ydalpom, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,780	2,780	5,480	3,540	3,230	5,480	6,000	4,180	2,780	2,510	2,450	2,450
2	2,780	2,780	4,660	3,540	3,230	5,310	6,000	4,020	2,780	2,510	2,450	2,450
3	2,780	2,780	4,340	3,540	3,230	5,480	5,650	4,020	2,780	2,510	2,450	2,450
4	2,780	2,930	4,020	3,540	3,230	5,650	5,480	4,020	2,780	2,510	2,450	2,450
5	2,780	2,930	3,700	3,540	4,980	5,650	5,310	4,020	2,640	2,510	2,450	2,450
6	2,780	2,930	3,220	3,540	7,120	5,820	5,310	4,020	2,640	2,510	2,450	2,450
7	2,780	2,930	3,080	3,380	6,360	6,000	5,140	4,020	2,640	2,510	2,450	2,450
8	2,780	2,930	3,080	3,380	5,480	6,180	5,140	3,860	2,640	2,510	2,450	2,450
9	2,780	2,930	3,080	3,380	4,820	6,360	5,140	3,860	2,640	2,510	2,450	2,450
10	2,780	2,930	3,080	3,380	4,500	6,360	4,980	3,700	2,510	2,510	2,450	2,450
11	2,780	2,930	3,080	3,380	4,500	7,320	4,980	3,700	2,510	2,510	2,450	2,450
12	2,780	3,080	3,080	3,380	4,340	6,550	4,980	3,700	2,510	2,450	2,450	2,640
13	2,780	3,080	3,080	3,380	4,180	6,000	4,820	3,700	2,510	2,450	2,450	3,700
14	2,780	3,080	3,080	3,380	4,020	5,480	4,820	3,700	2,510	2,450	2,450	3,080
15	2,780	3,080	3,080	3,380	3,860	5,480	4,980	3,540	2,510	2,450	2,450	3,080
16	2,780	3,080	3,080	3,230	3,860	5,310	4,980	3,540	2,510	2,450	2,450	2,930
17	2,780	3,080	3,080	3,230	3,860	7,920	4,660	3,540	2,510	2,450	2,450	2,780
18	2,780	3,080	3,080	3,230	3,860	12,700	4,660	3,380	2,510	2,450	2,450	2,640
19	2,780	3,080	3,080	3,230	3,700	11,700	4,660	3,380	2,510	2,450	2,450	2,510
20	2,780	3,080	3,080	3,230	3,700	10,100	4,660	3,380	2,510	2,450	2,450	2,510
21	2,780	3,080	3,080	3,230	3,860	8,540	4,660	3,380	2,510	2,450	2,450	2,510
22	2,780	3,080	3,080	3,230	6,550	9,610	4,500	3,230	2,510	2,450	2,450	2,510
23	2,780	3,080	3,080	3,230	7,320	8,750	4,500	3,230	2,510	2,450	2,450	2,510
24	2,780	3,080	3,080	3,230	6,550	10,800	4,340	3,080	2,510	2,450	2,450	2,510
25	2,780	3,080	4,340	3,230	6,360	15,000	4,340	3,080	2,510	2,510	2,450	2,510
26	2,780	3,080	8,120	3,230	6,000	11,700	4,340	3,080	2,510	2,450	2,450	2,510
27	2,780	3,080	4,820	3,230	6,000	10,500	4,340	2,930	2,510	2,450	2,450	2,510
28	2,780	3,080	4,020	3,230	5,820	9,170	4,340	2,930	2,510	2,450	2,450	2,510
29	2,780	4,340	3,700	3,230	.....	8,120	4,340	2,780	2,510	2,450	2,450	2,510
30	2,780	4,660	3,700	3,230	.....	7,320	4,180	2,780	2,510	2,450	2,450	2,510
31	2,780	.....	3,540	3,230	.....	6,360	.....	2,780	.....	2,450	2,450	.....

Monthly discharge of Pit Creek at Ydalpom, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 5,360 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,780	2,780	2,780	0.529	0.61	171,000
November	4,660	2,780	3,100	.589	.66	184,000
December	8,120	3,080	3,650	.694	.80	224,000
January	3,540	3,230	3,330	.633	.73	205,000
February	7,320	3,230	4,800	.913	.95	267,000
March	12,700	5,310	7,830	1.49	1.72	481,000
April	6,000	4,180	4,870	.926	1.03	290,000
May	4,180	2,780	3,500	.665	.77	215,000
June	2,780	2,510	2,570	.489	.55	153,000
July	2,510	2,450	2,470	.470	.54	152,000
August	2,450	2,450	2,450	.466	.54	151,000
September	3,700	2,450	2,600	.494	.55	155,000
The year	12,700	2,450	3,660	.696	9.45	2,650,000

PINE CREEK NEAR ALTURAS, CALIF.

LOCATION.—In SE. ¼ SW. ¼ sec. 35, T. 42 N., R. 13 E., at Alturas Electric Light & Power Co.'s power house, 6 miles above mouth of creek and 9 miles southeast of Alturas, Modoc County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 27 to September 30, 1918.

GAGE.—Vertical staff fastened to wall of machine shop on left bank, 30 feet below discharge pipe of power plant; read by I. W. Gibbins.

DISCHARGE MEASUREMENTS.—Made by wading or from a footbridge above gage.

CHANNEL AND CONTROL.—Large irregular boulders and gravel; rough; permanent. Left bank is a sloping stone wall; right bank slopes gradually. Channel straight above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet at 7.30 a. m. June 15 (discharge, 26 second-feet); minimum stage recorded 1.40 feet several days in June (discharge, 15 second-feet).

DIVERSIONS.—The Alturas Electric Light & Power Co. diverts water above the gage and returns it 30 feet above the gage.

REGULATION.—Diurnal fluctuation caused by operation of power plant just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 30 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Pine Creek near Alturas, Calif., during the period May 27 to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 27	Kunesh and Baker	1.60	24
June 26	J. F. Kunesh	1.40	15

Daily discharge, in second-feet, of Pine Creek near Alturas, Calif., for the period May 27 to Sept. 30, 1918.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1		18	11		23	21		21
2		15	12		23	22		19
3		17	13		23	23		15
4		17	14		25	24		19
5		19	15		25	25		18
6		21	16		23	26		15
7		19	17		24	27	24	15
8		20	18		24	28	24	15
9		20	19		24	29	23	15
10		23	20		23	30	22	15
						31	24	

NOTE.—Record started May 27; no record July 1 to Sept. 30.

Monthly discharge of Pine Creek near Alturas, Calif., for the period May 27 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 27-31	24	22	23.4	232
June	25	15	19.8	1,180

McCLOUD RIVER AT BAIRD, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 34 N., R. 4 W., at United States fishery at Baird, Shasta County, 2 miles above junction with Pit River. Bailey Creek enters 2,000 feet above and Johns Creek 2,000 feet below station.

DRAINAGE AREA.—665 square miles.

RECORDS AVAILABLE.—December 22, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on right bank, 600 feet above the hatchery; read by employees of United States fishery.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Gravel and cobblestones; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.35 feet at noon March 19 (discharge, 11,000 second-feet); minimum stage recorded, 1.34 feet September 10 and 11 (discharge, 910 second-feet).

1910–1918: Maximum stage recorded, 14.3 feet at noon February 2, 1917 (discharge, 27,600 second-feet); minimum stage recorded, 1.34 feet September 10 and 11, 1918 (discharge, 910 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by W. K. Hancock, superintendent of the United States fishery.

Discharge measurements of McCloud River at Baird, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 23	Charles Leidl	1.42	930
Sept. 18	J. F. Kunesh	1.37	942

Daily discharge, in second-feet, of McCloud River at Baird, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,080	1,080	2,190	1,340	1,080	1,570	2 810	1,650	1,140	1,020	965	965
2	1,080	1,080	2,090	1,270	1,080	1,490	2,700	1,650	1,140	1,020	965	965
3	1,080	1,080	1,270	1,200	1,080	1,490	2,490	1,650	1,140	1,020	965	965
4	1,080	1,080	1,200	1,200	1,080	1,490	2,290	1,570	1,140	1,020	965	965
5	1,080	1,080	1,200	1,200	1,340	1,490	2,190	1,570	1,140	1,020	965	965
6	1,080	1,080	1,140	1,200	3,730	1,490	2,090	1,570	1,140	1,020	965	965
7	1,080	1,080	1,140	1,200	4,680	1,490	2,000	1,490	1,140	1,020	965	965
8	1,080	1,080	1,140	1,140	2,920	1,490	2,000	1,490	1,140	1,020	965	965
9	1,980	1,080	1,140	1,140	2,290	1,490	4,260	1,490	1,140	1,020	965	965
10	1,080	1,080	1,080	1,140	2,000	1,490	3,730	1,490	1,080	965	965	910
11	1,080	1,080	1,080	1,140	1,730	1,650	3,250	1,410	1,080	965	965	910
12	1,080	1,270	1,080	1,140	1,650	2,190	2,920	1,410	1,080	965	965	965
13	1,080	1,140	1,080	1,140	1,650	2,190	2,700	1,410	1,080	965	965	965
14	1,080	1,080	1,080	1,200	1,650	2,000	2,490	1,340	1,080	965	965	1,080
15	1,080	1,080	1,080	1,200	1,650	1,820	2,290	1,340	1,080	965	965	1,020
16	1,080	1,080	1,080	1,200	1,650	1,730	2,190	1,340	1,080	965	965	965
17	1,080	1,080	1,080	1,200	1,570	1,730	2,090	1,340	1,080	965	965	965
18	1,800	1,080	1,080	1,270	1,490	5,110	2,090	1,340	1,080	965	965	965
19	1,080	1,080	1,080	1,200	1,490	11,000	2,000	1,340	1,080	965	965	965
20	1,080	1,080	1,080	1,200	1,490	5,410	1,910	1,340	1,080	965	965	965
21	1,080	1,080	1,080	1,200	1,410	3,860	1,910	1,270	1,080	965	965	965
22	1,080	1,080	1,080	1,140	1,410	3,490	1,910	1,270	1,080	965	965	965
23	1,080	1,080	1,080	1,140	1,650	3,610	1,910	1,270	1,020	965	965	965
24	1,080	1,080	1,080	1,140	2,490	3,490	1,910	1,200	1,020	965	965	965
25	1,080	1,080	1,080	1,140	2,190	4,400	1,820	1,200	1,020	965	965	965
26	1,080	1,080	2,190	1,140	2,000	5,260	1,820	1,200	1,020	965	965	965
27	1,080	1,080	2,290	1,140	1,730	4,820	1,820	1,200	1,020	965	965	965
28	1,080	1,080	2,290	1,080	1,650	3,860	1,730	1,200	1,020	965	965	965
29	1,080	1,080	1,410	1,080	.....	3,370	1,650	1,200	1,020	965	965	965
30	1,080	1,820	1,340	1,080	.....	3,140	1,650	1,140	1,020	965	965	965
31	1,080	.....	1,340	1,080	.....	3,030	.....	1,140	.....	965	965	.....

Monthly discharge of McCloud River at Baird, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1,080	1,080	1,080	1.62	1.87	66,400
November	1,820	1,080	1,110	1.67	1.86	66,000
December	2,290	1,080	1,310	1.97	2.27	80,500
January	1,340	1,080	1,170	1.76	2.03	71,900
February	4,680	1,080	1,850	2.78	2.90	103,000
March	11,000	1,490	2,970	4.47	5.15	183,000
April	4,260	1,650	2,290	3.44	3.84	136,000
May	1,650	1,140	1,370	2.06	2.38	84,200
June	1,140	1,020	1,080	1.62	1.81	64,300
July	1,020	965	981	1.48	1.71	60,300
August	965	965	965	1.45	1.67	59,300
September	1,080	910	967	1.45	1.62	57,500
The year	11,000	910	1,430	2.15	29.11	1,030,000

LITTLE STONY CREEK BASIN.

LITTLE STONY CREEK NEAR LODOGA, CALIF.

LOCATION.—At East Park reservoir, 4 miles above junction with Stony Creek and 3½ miles northwest of Lodoga, Colusa County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—January 1, 1908 to September 30, 1918; only discharge measurements in 1907.

GAGE.—Record beginning December 1, 1910, is from gage at the dam; prior to that date gage was a short distance below present site. Gage read by J. J. Lea.

DISCHARGE.—Computed from gage readings at the dam. Correction made for evaporation, which is measured by evaporation pan at reservoir. When discharge is 10 second-feet or less it is computed from weir and current-meter measurements taken at the head of the reservoir about 3 miles above the dam.

EXTREMES OF DISCHARGE.—1907–1918: Maximum stage reported, 11.8 feet February 2, 1909 (discharge, 7,060 second-feet); minimum stage, no flow during parts of every year.

DIVERSIONS.—No information.

REGULATION.—East Park reservoir is used for storage for the Orland project of the United States Reclamation Service.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service, through A. N. Burch, project manager.

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Sept.
1	2.0	1.0	1.0	5.5	7.5	71	92	30	6.0	.....
2	2.0	1.0	1.0	5.5	9	56	71	30	5.5	.....
3	2.0	1.0	1.0	5.5	9.5	68	98	36	5.0	.....
4	2.0	1.0	1.0	5.5	7.5	79	104	33	5.0	.....
5	2.0	1.0	1.0	5.5	9.5	71	96	45	4.0	.....
6	2.0	1.0	1.0	1.5	70	70	100	27	4.0	.....
7	2.0	1.0	1.0	1.0	181	48	58	32	3.0	.....
8	2.0	1.0	1.0	1.0	70	92	76	20	3.0	.....
9	2.0	1.0	1.0	1.0	29	70	52	25	3.0	.....
10	2.0	1.0	1.0	1.0	20	47	78	50	3.0	.....
11	2.0	1.0	1.0	1.0	29	152	77	60	2.0	.....
12	2.0	1.0	1.0	1.0	24	241	58	40	2.0	22
13	2.0	1.0	1.0	5.0	23	120	73	12	2.0	33
14	2.0	1.0	1.0	7.5	18	106	84	12	2.0	17
15	2.0	1.0	1.0	7.5	16	94	70	12	2.0	3.0
16	2.0	1.0	1.0	7.5	12	67	82	12	2.0	4.0
17	2.0	1.0	1.0	7.5	74	45	86	11	2.0	5.0
18	2.0	1.0	1.0	7.5	92	100	71	11	2.0	3.0
19	2.0	1.0	1.0	8	30	375	14	10	1.0	3.0
20	2.0	1.0	1.0	10	78	188	38	10	1.0	4.0
21	2.0	1.0	1.0	10	105	137	104	10	.5	3.0
22	2.0	1.0	1.0	10	344	147	84	9	.5	1.0
23	2.0	1.0	1.0	10	265	54	38	9	.5	.....
24	2.0	1.0	1.0	10	284	142	35	8	.5	.....
25	2.0	1.0	12	10	103	157	35	8	.5	.....
26	2.0	1.0	12	7	121	184	30	7	.5	.....
27	2.0	1.0	68	3.3	60	60	70	7	.5	.....
28	2.0	1.0	20	3.3	50	121	48	7	.5	.....
29	2.0	1.0	8	3.3	.....	136	35	7	.5	.....
30	2.0	1.0	7.5	3.3	.....	101	25	6	.5	.....
31	2.0	.....	5.0	3.3	.....	128	.....	5.5	.....	.....

NOTE.—No flow July 1 to Sept. 11 and Sept. 23–30.

Monthly discharge of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2.0	2.0	2.00	0.020	0.02	123
November	1.0	1.0	1.00	.010	.01	59.5
December	68	1.0	5.05	.050	.06	311
January	10	1.0	5.45	.053	.06	335
February	344	7.5	76.5	.750	.78	4,250
March	375	45	114	1.12	1.29	7,010
April	104	25	66.1	.648	.72	3,930
May	45	5.5	19.4	.190	.22	1,190
June	6	.5	2.15	.021	.02	128
September	33	.0	3.27	.032	.04	195
The year	375	.0	24.2	.237	3.22	17,500

FEATHER RIVER AND TRIBUTARIES.

NORTH FORK OF FEATHER RIVER NEAR PRATTVILLE, CALIF.

LOCATION.—In sec. 28, T. 27 N., R. 8 E., below Great Western Power Co.'s dam at Lake Almanar (Big Meadows), 4 miles above mouth of Butt Creek and 5 miles southeast of Prattville, Plumas County.

DRAINAGE AREA.—506 square miles above dam site.

RECORDS AVAILABLE.—June 13, 1905, to September 30, 1918.

GAGE.—Vertical staff in flume about 500 feet below dam. Original gage was a Friez water-stage recorder nearly on south line of sec. 21 (above the dam); it was moved downstream about 1,300 feet April 29, 1912, and again about 2,200 feet downstream July 31, 1912. The Friez recorder was discontinued March 21, 1914, when the station was moved to present site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made in flume at gage.

CHANNEL AND CONTROL.—No information.

EXTREMES OF DISCHARGE.—1905–1918: Maximum stage recorded, 16.2 feet, crest of flood, March 19, 1907 (discharge, 10,000 second-feet); minimum stage, dry April 15 and 16, 1914 (water being stored).

DIVERSIONS.—No information.

REGULATION.—Since March 7, 1914, the record shows quantity of water released from Lake Almanar reservoir. There were 135,000 acre-feet of water in reservoir September 30, 1917; and 133,000 acre-feet September 30, 1918.

COOPERATION.—Record of discharge and storage furnished by Great Western Power Co., through P. W. Ham, chief engineer.

Daily discharge, in second feet, of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,000	1,790	708	1,130	680	500	75	100	100	700	1,150	900
2	2,110	1,790	400	1,130	670	472	75	100	100	700	1,220	988
3	2,080	1,720	1,270	1,180	670	381	75	100	100	700	971	1,100
4	2,080	1,630	1,250	1,180	665	420	100	100	100	700	1,110	1,050
5	2,070	1,720	1,220	1,080	660	250	100	100	100	700	1,080	1,050
6	1,930	1,610	1,190	943	334	359	100	100	100	700	1,150	1,000
7	1,780	1,900	1,180	889	200	294	100	100	100	817	1,120	800
8	1,920	1,900	1,150	848	155	300	100	100	100	900	1,120	992
9	2,020	1,800	1,110	880	142	300	100	100	100	979	1,120	1,080
10	2,200	1,800	1,080	815	183	253	100	100	177	1,040	812	1,050
11	2,000	1,560	1,170	800	571	100	100	100	362	1,010	1,130	800
12	2,020	1,600	1,510	617	600	100	100	100	400	1,050	1,150	809
13	2,060	1,560	1,490	800	600	100	100	100	400	746	1,150	588
14	1,750	1,560	1,450	790	600	100	100	100	400	850	1,150	438
15	2,020	1,700	1,340	790	600	100	100	100	400	850	1,120	800
16	2,020	1,670	1,180	780	469	100	100	100	700	813	1,020	950
17	2,000	1,510	1,230	780	100	100	100	100	600	800	800	871
18	2,000	1,350	1,180	780	560	100	100	100	525	800	1,000	871
19	2,040	1,500	1,120	770	600	100	100	100	471	675	1,100	1,000
20	1,890	1,600	1,050	760	600	100	100	100	452	600	1,070	950
21	1,790	1,530	985	755	538	100	100	100	500	750	1,290	700
22	1,980	1,480	831	740	384	100	100	100	500	871	1,090	900
23	1,990	1,440	698	725	277	100	100	100	550	1,030	1,220	950
24	1,990	1,380	880	720	100	100	100	100	550	1,110	1,000	892
25	1,990	1,130	697	720	121	100	100	100	672	781	1,150	650
26	2,000	1,320	270	720	200	100	100	100	700	975	1,200	583
27	1,950	1,290	200	690	368	75	100	100	700	712	1,390	483
28	1,740	1,210	584	690	500	75	100	100	700	1,100	1,300	304
29	1,890	1,120	883	690	.....	75	100	100	700	1,040	1,480	375
30	1,790	1,190	946	685	.....	75	100	100	700	1,180	1,410	607
31	1,790	.....	1,160	680	.....	75	.....	100	.....	1,140	979	.....

Monthly discharge of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.				Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	Mean stored in reservoir.[a]	
October	2,200	1,740	1,960	−1,030	121,000
November	1,900	1,120	1,550	− 620	92,200
December	1,510	200	1,010	− 230	62,100
January	1,180	617	821	− 161	50,500
February	680	100	434	+ 351	24,100
March	500	75	178	+ 812	10,900
April	100	75	97.5	+1,290	5,800
May	100	100	100	+ 911	6,150
June	700	100	402	+ 100	23,900
July	1,180	600	865	− 498	53,200
August	1,480	800	1,130	− 720	69,500
September	1,100	304	817	− 210	48,600
The year	2,200	75	784	.....	568,000

[a] The discharge in this column added to that in the column of "Means" gives the estimated unregulated discharge.

NOTE.—This table, except monthly "Mean stored in reservoir," computed by engineers of U. S. Geological Survey.

NORTH FORK OF FEATHER RIVER AT BIG BAR, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 23 N., 5 E., one-fourth mile above Big Bar station on Western Pacific Railroad, Butte County, and about 7 miles above intake of Great Western Power Co.'s power plant at Big Bend.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 24, 1911, to September 30, 1918.

GAGE.—Bristol water-stage recorder. Original gage was a staff installed July, 1910, opposite the middle of Jesse Moore Bar. Station was moved 300 feet upstream, January 17, 1911, and the Bristol water-stage recorder was installed; gage datum, 1,347.96 feet above sea level (United States Geological Survey datum). In November, 1912, the Bristol gage was moved upstream 130 feet; gage datum now 1,348.96 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Solid rock, boulders and gravel; practically permanent.

EXTREMES OF DISCHARGE.—1911–1918: Maximum mean daily discharge, 35,000 second-feet January 1, 1914; minimum mean daily discharge, 825 second-feet June 10, 1918.

DIVERSION.—No information.

REGULATION.—Flow partly regulated by storage in Lake Almanar.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co., through P. W. Ham, chief engineer.

Daily discharge, in second-feet, of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,250	2,130	2,800	1,870	1,250	1,750	5,500	3,200	1,170	1,180	1,560	1,220
2	2,300	2,160	1,400	1,890	1,250	1,580	5,140	3,160	1,060	1,120	1,560	1,200
3	2,320	2,190	2,080	1,700	1,230	1,810	4,330	3,090	1,110	1,140	1,550	1,320
4	2,280	2,170	1,940	1,930	1,250	2,120	3,520	3,200	1,060	1,220	1,320	1,370
5	2,250	2,170	1,890	1,730	1,500	1,860	3,110	2,980	1,000	1,110	1,320	1,340
6	2,210	2,100	1,860	1,650	6,460	1,530	2,970	2,760	982	1,060	1,550	1,350
7	2,030	2,220	1,770	1,630	3,380	1,720	3,080	2,620	963	1,040	1,370	1,260
8	2,110	2,250	1,700	1,600	2,500	1,630	3,130	2,560	949	1,240	1,440	1,120
9	2,180	2,120	1,680	1,570	1,890	1,530	6,480	2,680	887	1,270	1,440	1,250
10	2,300	2,100	1,680	1,470	1,560	1,590	7,700	2,450	825	1,370	1,340	1,390
11	2,230	2,080	1,600	1,410	1,700	2,190	6,300	2,220	859	1,520	1,170	1,380
12	2,130	2,110	2,000	1,480	1,860	3,220	5,560	2,190	1,070	1,500	1,520	1,300
13	2,130	2,030	2,080	1,390	1,990	2,540	5,010	2,200	1,090	1,510	1,540	1,730
14	2,120	2,030	1,970	1,570	2,050	2,170	4,190	2,170	1,080	1,200	1,540	1,620
15	2,150	2,030	1,940	1,490	1,810	1,940	3,770	2,020	1,070	1,420	1,500	1,090
16	2,200	2,030	1,820	1,430	2,010	1,960	3,540	1,850	1,090	1,340	1,410	1,470
17	2,220	2,030	1,890	1,420	1,710	1,720	3,520	1,790	1,470	1,310	1,440	1,410
18	2,170	1,880	1,850	1,540	1,520	4,320	3,500	1,730	1,550	1,310	1,130	1,310
19	2,170	1,700	1,770	1,520	2,170	5,650	3,430	1,710	1,240	1,270	1,340	1,350
20	2,190	2,070	1,670	1,440	2,030	3,880	3,530	1,720	1,060	1,150	1,570	1,380
21	2,210	2,150	1,550	1,400	2,030	3,300	3,790	1,640	1,100	1,020	1,460	1,300
22	2,220	2,080	1,490	1,380	1,930	3,140	4,160	1,550	1,180	1,180	1,730	1,110
23	2,220	2,020	1,190	1,380	2,520	3,140	4,320	1,500	1,200	1,370	1,400	1,400
24	2,210	1,960	1,480	1,360	2,480	3,160	4,210	1,450	1,240	1,630	1,460	1,500
25	2,300	1,840	1,470	1,360	2,160	6,300	3,920	1,380	1,250	1,550	1,340	1,390
26	2,280	1,850	3,190	1,360	1,900	10,900	3,630	1,350	1,360	1,440	1,500	1,190
27	2,210	1,900	2,470	1,300	1,850	9,340	3,340	1,350	1,300	1,400	1,690	1,130
28	2,100	1,870	1,470	1,300	2,120	6,240	3,150	1,300	1,270	1,210	1,730	1,130
29	2,100	1,810	1,780	1,300	.....	5,240	3,140	1,250	1,170	1,440	1,690	1,280
30	2,130	2,360	1,750	1,300	.....	5,150	3,200	1,200	1,170	1,550	1,850	1,240
31	2,140	.....	1,940	1,280	.....	5,410	.....	1,180	.....	1,650	1,690	.....

Monthly discharge of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,320	2,030	2,200	135,000
November	2,360	1,700	2,050	122,000
December	3,190	1,190	1,840	113,000
January	1,930	1,280	1,500	92,200
February	6,460	1,230	2,080	116,000
March	10,900	1,530	3,490	215,000
April	7,700	2,970	4,140	246,000
May	3,200	1,180	2,050	126,000
June	1,550	825	1,130	67,200
July	1,650	1,040	1,310	80,500
August	1,850	1,130	1,490	91,600
September	1,730	1,090	1,320	78,500
The year	10,900	825	2,050	1,480,000

FEATHER RIVER AT OROVILLE, CALIF.

LOCATION.—In sec. 8, T. 19 N., R. 4 E., at highway bridge at Oroville, Butte County, 6 miles below junction of north and middle forks, and 30 miles above mouth of Yuba River.

DRAINAGE AREA.—3,640 square miles.

RECORDS AVAILABLE.—January 1, 1902, to September 30, 1918.

GAGE.—Friez water-stage recorder, installed December 16, 1912, on right bank 200 feet below bridge, at same datum as United States Weather Bureau vertical staff which is in two sections on pier of highway bridge near right bank. Weather Bureau gage was used 1902 to 1905, by adding 2 feet to the readings to reduce them to the datum of the United States Geological Survey staff gage installed on left bank about 1,000 feet above the bridge in December, 1905. The latter gage was washed out several times and, until repaired, the Weather Bureau gage was used.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above bridge. At extreme low water measurements have been made from a boat about 1,000 feet below the bridge.

CHANNEL AND CONTROL.—Boulders and gravel; shift somewhat during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.83 feet at 10 a. m. March 26 (discharge, 38,000 second-feet); minimum stage from water-stage recorder, 0.06 foot at 10 a. m. September 9 (discharge, 912 second-feet).

1902–1918: Maximum stage recorded, 30.2 feet on Weather Bureau gage; 39.3 feet on gage 1,000 feet above, March 19, 1907 (discharge, 187,000 second-feet) minimum stage from water-stage recorder, —0.13 foot at 10 a. m. October 7, 1913 (discharge, 790 second-feet).

DIVERSIONS.—Minor diversions from tributaries above the station.

STORAGE.—See North Fork of Feather River near Prattville, Calif.

REGULATION.—The operation of the Big Bend plant of the Great Western Power Co., causes diurnal fluctuations in stage, especially during extreme low water, when it amounts to about a foot.

ACCURACY.—Stage-discharge relation changed March 25. Rating curves well defined above 1,000 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge October 1 to March 16 ascertained with a discharge integrator; March 17 to September 30 by applying mean daily gage height to the rating table except February 6, 7, March 18, 25, and April 9, when hourly discharge was averaged. Records excellent.

Discharge measurements of Feather River at Oroville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 5	4.96	6,950	July 20	0.21	1,020
5	4.90	6,860	20	.20	1,010
July 20	1.03	1,620			

Daily discharge, in second-feet, of Feather River at Oroville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,180	2,120	4,650	2,090	1,570	2,530	14,600	7,400	2,450	1,540	1,760	1,420
2	2,150	2,100	2,730	2,200	1,500	2,630	13,500	7,400	2,300	1,500	1,760	1,340
3	2,200	2,060	2,050	2,090	1,470	2,630	11,000	7,110	2,400	1,580	1,680	1,460
4	2,130	2,110	2,350	2,220	1,530	2,820	9,000	7,400	2,300	1,460	1,460	1,500
5	2,180	2,260	2,210	2,100	1,800	2,760	7,700	7,110	2,150	1,500	1,680	1,500
6	2,210	2,680	2,140	1,930	15,100	2,420	7,110	6,340	2,100	1,420	1,630	1,540
7	1,950	2,360	2,050	1,900	8,660	3,150	7,400	6,110	2,050	1,460	1,580	1,580
8	2,180	2,280	1,980	1,810	4,850	3,250	7,400	6,110	2,000	1,540	1,630	1,260
9	2,220	2,320	1,940	1,730	3,500	2,850	16,700	5,890	1,810	1,580	1,630	1,340
10	2,210	2,240	1,910	1,740	2,800	3,140	22,000	5,320	1,860	1,630	1,630	1,500
11	2,220	2,130	1,880	1,700	2,700	5,300	18,100	5,020	1,720	1,760	1,420	1,500
12	2,210	2,440	1,930	1,900	2,880	6,020	15,800	4,760	1,900	1,760	1,540	1,580
13	2,220	2,410	1,980	1,600	2,950	4,980	13,500	5,020	1,900	1,680	1,630	2,660
14	1,950	2,320	2,030	1,970	3,220	4,050	10,500	4,760	1,900	1,420	1,630	2,780
15	2,210	2,210	2,080	1,800	2,900	3,320	9,350	4,500	1,810	1,540	1,580	2,000
16	2,220	2,250	2,130	1,850	2,600	3,350	8,330	4,110	1,630	1,580	1,680	1,900
17	2,180	2,200	2,170	1,810	3,470	3,130	8,330	3,990	1,950	1,540	1,630	1,810
18	2,160	1,920	2,040	1,930	2,570	11,000	8,330	3,990	2,250	1,460	1,340	1,680
19	2,190	2,120	1,970	1,970	2,700	18,100	8,330	3,750	1,760	1,460	1,540	1,680
20	2,170	2,000	1,880	1,780	2,550	9,580	8,330	3,750	1,680	1,380	1,580	1,680
21	2,010	2,180	1,800	1,760	2,550	7,190	9,000	3,630	1,630	1,180	1,630	1,580
22	2,270	2,100	1,600	1,600	3,200	6,630	9,720	3,510	1,540	1,380	1,720	1,420
23	2,220	2,100	1,550	1,600	4,000	6,630	10,500	3,390	1,540	1,630	1,680	1,630
24	2,210	2,050	1,650	1,700	4,200	6,630	9,720	3,270	1,680	1,630	1,680	1,630
25	2,210	1,880	1,720	1,660	3,460	16,600	9,000	3,160	1,630	1,720	1,420	1,460
26	2,240	1,980	4,450	1,600	2,720	35,000	8,330	3,000	1,630	1,720	1,580	1,380
27	2,170	1,940	5,560	1,460	2,630	30,500	7,400	2,880	1,630	1,680	1,680	1,340
28	2,050	2,000	2,800	1,600	2,550	19,900	6,840	2,880	1,580	1,420	1,810	1,260
29	2,150	1,880	2,370	1,550	.....	15,800	7,110	2,660	1,630	1,680	1,860	1,630
30	2,130	1,990	2,370	1,490	.....	15,200	7,110	2,500	1,500	1,710	1,860	1,580
31	2,130	.....	2,250	1,500	.....	15,200	.....	2,610	.....	1,680	1,810	.....

NOTE.—No gage-height record Dec. 12–16; discharge interpolated.

Monthly discharge of Feather River at Oroville, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,270	1,950	2,170	0.596	0.69	133,000
November	2,680	1,880	2,150	.591	.66	128,000
December	5,560	1,550	2,330	.640	.74	143,000
January	2,220	1,460	1,790	.492	.56	110,000
February	16,100	1,470	3,450	.948	.99	192,000
March	35,000	2,420	8,780	2.69	3.10	540,000
April	22,000	6,840	10,300	2.83	3.16	613,000
May	7,400	2,500	4,620	1.27	1.46	284,000
June	2,450	1,500	1,860	.511	.57	111,000
July	1,760	1,180	1,560	.429	.49	95,900
August	1,860	1,340	1,640	.451	.52	101,000
September	2,780	1,260	1,620	.445	.50	96,400
The year	35,000	1,180	3,520	.967	13.44	2,550,000

BUTT CREEK AT BUTTE VALLEY, CALIF.

LOCATION.—At lower end of Butte Valley, 100 feet below footbridge, 1,000 feet above intake to Great Western Power Co.'s diversion flume, one-fourth mile south of Butte Valley post office, Plumas County, and 2 miles above junction with North Fork of Feather River.

DRAINAGE AREA.—73 square miles at original station.

RECORDS AVAILABLE.—June 14, 1905, to September 30, 1918.

GAGE.—Vertical staff on left bank, installed July 19, 1912, seven-eighths mile upstream from original vertical staff, which was on right bank. This gage is out of the influence of the low-water diversion dam near the flume intake for the Great Western Power Co.'s Butt Creek plant.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Sand, gravel, and clay; practically permanent.

EXTREMES OF DISCHARGE.—1905–1918: Maximum mean daily discharge, 1,640 second-feet January 16, 1909; minimum mean daily discharge, 10 second-feet August 27–28, 1918.

DIVERSIONS.—Pacific Gas & Electric Co. diverts water through Wallack ditch from Butt Creek above the station into the drainage basin of Yellow Creek; capacity of ditch, 15 to 20 second-feet.

REGULATION.—No information.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co. through P. W. Ham, Chief engineer.

Daily discharge, in second-feet, of Butt Creek near Butte Valley, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	111	33	22	47	215	138	45	15	13	11
2	24	24	52	32	24	47	205	140	41	14	13	12
3	24	28	37	32	26	48	157	138	39	14	12	12
4	24	41	34	32	27	53	134	130	37	14	12	12
5	23	45	32	29	34	47	130	130	36	14	13	12
6	24	47	29	29	175	47	132	126	35	13	13	13
7	24	29	28	31	132	51	135	118	34	13	13	13
8	23	28	24	30	68	46	141	118	33	13	13	13
9	23	28	27	30	55	42	317	122	32	13	12	15
10	23	28	25	34	53	42	305	116	29	13	12	15
11	23	28	26	27	53	71	257	97	28	13	13	14
12	23	45	25	35	47	50	240	92	27	13	12	18
13	22	32	25	33	47	69	222	88	26	13	12	74
14	23	28	26	35	50	44	179	85	23	13	13	56
15	24	28	27	30	37	54	166	79	21	13	13	25
16	24	27	27	30	57	52	157	76	20	13	13	17
17	24	27	37	34	56	66	168	77	20	13	14	16
18	24	27	31	37	57	119	163	75	20	13	13	15
19	24	27	27	30	56	184	159	71	19	14	13	15
20	24	27	27	24	55	152	156	67	19	15	13	15
21	24	27	27	31	53	124	179	64	19	15	13	15
22	24	27	27	28	53	125	194	63	19	14	13	16
23	24	27	27	31	37	133	200	61	19	14	13	18
24	24	27	27	32	55	130	202	58	18	14	13	18
25	24	27	29	29	51	290	186	58	19	15	12	17
26	24	26	103	26	48	384	168	61	17	15	11	16
27	24	26	106	31	43	275	156	62	16	14	10	16
28	24	31	54	31	48	205	145	56	16	14	10	18
29	24	29	41	29	.....	195	140	53	16	14	11	68
30	24	38	38	26	.....	200	135	50	16	14	11	30
31	24	.....	35	24	.....	216	.....	47	.....	13	11	.....

Monthly discharge of Butt Creek near Butte Valley, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	22	23.7	1,460
November	47	24	30.1	1,790
December	111	24	38.4	2,360
January	35	24	30.5	1,880
February	175	22	54.2	3,010
March	384	42	116	7,130
April	317	130	181	10,800
May	140	47	87.9	5,400
June	45	16	25.3	1,510
July	15	13	13.7	842
August	14	10	12.4	762
September	74	11	20.8	1,240
The year	384	10	52.8	38,200

INDIAN CREEK NEAR CRESCENT MILLS, CALIF.

LOCATION.—In SW. ¼ sec. 25, T. 26 N., R. 9 E., at lower end of Indian Valley, 2,000 feet below Arlington Bridge, and 1¼ miles below Crescent Mills, Plumas County. Spanish Creek enters 4 miles below station.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—January 1, 1906, to December 31, 1909, and September 10, 1911, to March 31, 1918, when station was discontinued.

GAGE.—Vertical staff in four sections on right bank near observer's house; read by Charles Quigley. Same site and datum used throughout record, but lowest section of gage was 0.46 foot too low 1911 to August 12, 1915.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent. At low stages water is deep and sluggish at gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 7.18 feet at 5 a. m. March 27 (discharge, 2,780 second-feet); minimum stage recorded, 0.80 foot October 1-8 and 11 (discharge, 30 second-feet).

1906-1918: Maximum stage recorded, 20.2 feet at 6.30 a. m., crest of flood of March 19, 1907 (discharge, from extension of rating curve, about 11,700 second-feet); minimum stage recorded, 0.75 foot, August 9 to 15, 1908 (discharge, 12 second-feet).

DIVERSIONS.—Water is diverted from Indian Creek for irrigation in Indian and Genesee valleys.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 7. Rating curve used up to February 7 well defined between 30 and 4,000 second-feet; rating curve used after February 8 poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good to February 7 and poor after February 7.

Discharge measurements of Indian Creek near Crescent Mills, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	J. F. Kunesh	2.31	207	Mar. 30	Charles Leidl	5.83	1,590
14	do	2.31	210	30	do	5.88	1,590

Daily discharge, in second-feet, of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	30	60	110	125	100	204	16	40	80	98	132	154	357
2	30	59	171	118	104	222	17	34	74	110	132	139	357
3	30	59	171	111	104	263	18	39	73	110	132	154	674
4	30	60	148	111	104	357	19	40	72	104	132	162	945
5	30	82	125	111	111	306	20	41	72	97	118	170	820
6	30	84	111	111	586	263	21	41	72	97	111	178	674
7	30	80	108	111	855	284	22	43	72	97	111	195	674
8	30	73	97	111	504	306	23	45	73	97	111	242	674
9	31	72	97	111	306	263	24	45	77	96	111	331	945
10	32	72	97	111	222	242	25	43	79	125	111	263	1,420
11	30	77	93	111	186	602	26	42	82	171	110	242	2,600
12	32	94	93	125	170	674	27	45	84	171	100	213	2,800
13	32	84	97	140	186	535	28	48	96	155	100	195	1,870
14	39	84	97	140	222	384	29	50	96	140	100	.....	1,560
15	40	84	97	140	170	357	30	53	100	125	100	.....	1,710
							31	58	.....	125	100	.....	1,870

Monthly discharge of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	58	30	38.2	2,350
November	100	59	77.5	4,610
December	171	93	117	7,190
January	140	100	116	7,130
February	855	100	235	13,100
March	2,800	204	813	50,000
The period	.....	.....	.....	84,400

SPANISH CREEK AT KEDDIE, CALIF.

LOCATION.—In SW. ¼ sec. 22, T. 25 N., R. 9 E., at highway bridge at Keddie, Plumas County, 2 miles above junction with Indian Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1918.

GAGE.—Staff gage in two sections on left bank 250 feet below bridge. First section inclined; second section vertical; fastened to alder trees. Gage read by Miller and Luman.

Prior to August 12, 1914, low-water section was a vertical staff fastened to a stump on left bank 20 feet below bridge and a high-water section painted on the left abutment of bridge. From August 12, 1914, to September 30, 1917, gage was a vertical staff in three sections; first section on right bank 50 feet above bridge; second section on left bank 20 feet below bridge; third section fastened to downstream side of left bridge pier. Datum of present gage independent of datum of previous gages.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 3.50 p. m. March 26 (discharge, from extension of rating curve, about 2,600 second-feet); minimum stage recorded, 2.95 feet August 15 and 28 (discharge, 17 second-feet).

1911–1918: Maximum stage recorded, 10.0 feet at 11 a. m. December 31, 1913, and at 1 p. m. January 2, 1914 (discharge, from extension of rating curve, about 9,450 second-feet); minimum stage recorded, 2.95 feet August 15 and 28, 1918 (discharge, 17 second-feet).

DIVERSIONS.—Water is diverted from Spanish Creek for irrigation in American Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 30 second-feet and 1,000 second-feet and is extended above and below. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for high water, which are fair.

Discharge measurements of Spanish Creek at Keddie, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	J. F. Kunesh	3.92	170	Mar. 31	Charles Leidl	5.75	885
13	do	3.91	159	June 29	J. F. Kunesh	3.26	41
Mar. 31	Charles Leidl	5.78	839				

Daily discharge, in second-feet, of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	48	253	141	68	177	750	391	109	32	23	20
2	40	48	122	109	68	191	668	373	98	30	21	20
3	42	48	77	77	68	191	586	355	86	30	21	20
4	42	48	68	68	68	191	486	373	86	30	20	20
5	42	51	68	68	68	206	429	321	86	30	20	20
6	42	68	68	68	1,210	185	410	304	109	26	20	20
7	42	68	68	68	709	191	429	287	86	26	20	20
8	42	53	68	68	338	191	448	304	68	27	20	20
9	42	53	68	68	238	169	1,370	338	68	26	20	20
10	42	68	68	68	163	191	1,130	253	68	26	20	26
11	42	86	60	68	98	627	792	222	68	26	20	48
12	42	68	53	68	68	546	709	206	68	25	20	191
13	42	68	53	68	149	391	627	149	60	23	20	222
14	42	68	53	68	149	287	546	177	56	25	20	149
15	42	53	53	68	109	287	546	163	53	25	17	42
16	42	53	53	68	109	253	486	149	48	25	20	42
17	42	53	53	68	109	253	467	177	51	25	20	42
18	42	53	53	68	109	886	467	177	48	25	20	42
19	42	53	53	68	109	1,130	467	177	42	25	20	42
20	42	53	53	68	130	709	467	163	42	25	20	42
21	42	53	53	68	149	546	486	149	48	23	20	33
22	42	53	53	68	177	546	546	149	40	23	20	33
23	42	53	53	68	206	546	526	149	40	23	20	33
24	42	53	53	68	287	1,060	526	122	35	21	20	33
25	42	53	53	68	253	1,750	506	122	33	21	20	33
26	44	53	177	68	185	2,340	486	149	33	21	20	42
27	48	53	355	68	163	1,860	467	135	33	21	19	86
28	48	60	304	68	163	940	467	135	33	23	17	109
29	48	60	270	68	.....	792	448	163	33	23	20	109
30	48	149	253	68	.....	750	429	163	32	20	20	86
31	48	.....	222	68	.....	750	.....	122	.....	20	20	.....

Monthly discharge of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	48	40	42.9	2,640
November	149	48	60.0	3,570
December	355	53	107	6,580
January	141	68	72.0	4,430
February	1,210	68	204	11,300
March	2,340	169	617	37,900
April	1,370	410	572	34,000
May	391	122	213	13,100
June	109	32	58.7	3,490
July	32	20	24.9	1,530
August	23	17	19.9	1,220
September	222	20	55.5	3,300
The year	2,340	20	170	123,000

MIDDLE FORK OF FEATHER RIVER AT SLOAT, CALIF.

LOCATION.—Half a mile above Sloat, Plumas County, three-fourths mile above mouth of Poplar Creek, and 1½ miles below Cromberg.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 3, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank. Original gage was at California White Pine Co.'s log chute at Cromberg. Several changes in gage at that site were made. All were on downstream side of log chute piers and original datum was maintained. During construction of recorder well (Nov. 9–Dec. 4, 1913) a staff gage at new site and new datum was read. From December 5, 1913, to September 11, 1917, record is from a Gurley printing water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel, apparently permanent. Left bank, flat and timbered; will be submerged at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.55 feet at 6 a. m. March 26 (discharge, 3,680 second-feet); minimum stage, 2.50 feet from 2–6 a. m. August 25 (discharge, 40 second-feet).

1910–1918: Maximum stage recorded, 13.0 feet April 7, 1911 (discharge, 9,640 second-feet); minimum stage recorded, 2.50 feet August 25, 1918 (discharge, 40 second-feet).

ICE.—Stage-discharge relation not affected by ice this year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation has not changed since station was relocated in 1913; not affected by ice this year. Rating curve well defined below 6,000 second-feet and extended above. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage-height to rating table, except February 6 when hourly discharge was averaged. Records excellent.

Discharge measurements of Middle Fork of Feather River at Sloat, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 12	3.56	319
12	3.53	295

Daily discharge, in second-feet, of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	56	314	112	83	135	2,320	939	282	64	47	45
2	53	56	145	110	83	151	2,110	858	284	63	49	45
3	53	56	120	108	85	163	1,660	858	286	62	48	44
4	53	56	108	105	93	200	1,360	930	286	60	46	43
5	53	58	100	102	105	200	1,210	885	286	59	44	43
6	53	66	95	98	948	222	1,120	800	286	58	43	43
7	53	63	93	102	564	234	1,070	768	282	57	43	43
8	53	64	87	102	355	234	1,130	760	274	55	42	43
9	53	64	85	100	365	222	2,320	690	262	55	42	43
10	53	66	84	87	410	262	2,400	606	250	56	42	43
11	53	66	82	87	380	322	2,320	578	222	57	42	43
12	53	79	81	89	318	314	2,180	573	226	57	41	64
13	53	75	79	91	294	262	1,910	568	218	58	41	192
14	53	74	78	93	250	254	1,480	564	192	56	41	274
15	53	72	77	95	200	282	1,320	514	178	55	42	108
16	53	72	81	95	203	282	1,220	490	169	54	46	77
17	54	72	87	102	258	290	1,240	484	160	53	47	66
18	55	72	87	120	206	490	1,230	466	151	53	46	60
19	56	72	89	112	172	676	1,130	430	142	52	45	58
20	56	72	89	100	182	627	1,220	405	133	53	44	56
21	56	72	87	95	172	669	1,320	395	124	54	43	56
22	56	74	87	93	178	760	1,410	385	115	53	42	56
23	56	74	91	89	192	939	1,390	385	106	51	42	56
24	56	75	91	89	200	1,210	1,270	375	97	51	41	56
25	56	75	93	91	172	2,250	1,170	355	89	51	40	56
26	56	75	250	91	166	3,340	1,060	340	81	50	41	55
27	56	75	230	95	157	3,340	930	326	74	49	41	55
28	56	75	168	108	145	3,170	921	298	70	48	41	70
29	56	75	138	85	.....	2,930	903	278	66	48	42	98
30	56	95	122	81	.....	2,700	912	262	64	48	42	74
31	56	.....	118	81	.....	2,470	.....	274	.....	48	46	.....

NOTE.—No gage-height record Dec. 9–14, May 12, 13, 26, June 2, 9, 16–24, July 14, 28, Aug. 4, 5, 18–23, and Sept. 21–23; discharge interpolated.

Monthly discharge of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	56	53	54.4	3,340
November	95	56	69.9	4,160
December	314	77	114	7,010
January	120	81	97.0	5,960
February	948	83	248	13,800
March	3,340	135	955	58,700
April	2,400	903	1,440	85,700
May	939	262	543	33,400
June	286	64	182	10,800
July	64	48	54.5	3,350
August	49	40	43.3	2,660
September	274	43	68.8	4,090
The year	3,340	40	322	233,000

MIDDLE FORK OF FEATHER RIVER NEAR OROVILLE, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 20 N., R. 5 E., at highway bridge at Bidwell Bar, 2 miles above junction with North Fork, and 7 miles northeast of Oroville, Butte County. Canyon Creek enters three-fourths mile below and South Fork 1¼ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1911, to September 30, 1918.

GAGE.—Vertical staff in three sections; high-water section fastened to lower end of bridge pier near left bank; other sections fastened to a sycamore tree on left bank 100 feet above bridge; read by T. W. Curry.

DISCHARGE MEASUREMENTS.—Made from cable 250 feet below bridge.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.72 feet at 8 a. m. March 26 (discharge, 11,400 second-feet); minimum stage recorded, 1.86 feet August 31 and September 6 (discharge, 129 second-feet).

1911–1918: Maximum stage recorded, 18.0 feet at 4 p. m., December 31, 1913 (discharge, from extension of rating curve, about 34,200 second-feet); minimum stage recorded, 1.86 feet August 31 and September 6, 1918 (discharge, 129 second-feet).

DIVERSIONS.—The Palermo Land & Water Co.'s canal and South Feather Land & Water Co.'s canal divert from South Fork of Feather River and tributaries.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 26. Rating curves well defined below 14,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Discharge measurements of Middle Fork of Feather River near Oroville, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	Charles Leidl	6.24	2,980
July 21	....do	2.22	233
Aug. 26	S. T. Harding	1.89	136

Daily discharge, in second-feet, of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	210	210	1,820	455	285	775	6,250	3,590	980	342	192	134
2	210	210	830	435	345	725	5,700	3,730	960	325	192	134
3	210	210	518	415	345	775	4,650	3,460	960	325	192	139
4	210	220	435	398	330	890	3,870	3,460	900	318	186	134
5	210	220	380	380	475	890	3,460	3,460	900	305	180	134
6	210	415	362	380	4,180	830	3,330	3,070	900	299	174	129
7	210	315	345	380	3,590	950	3,330	2,820	845	292	168	134
8	200	270	345	380	1,820	1,150	3,330	2,820	845	286	168	134
9	200	255	345	362	1,300	1,010	4,820	2,700	795	279	162	134
10	200	255	330	362	1,150	950	8,020	2,360	795	273	162	139
11	200	255	315	330	1,080	1,380	6,630	2,150	745	273	162	145
12	200	362	300	330	950	2,230	6,250	2,050	745	273	162	162
13	200	345	300	415	1,300	1,820	5,700	2,050	700	266	156	745
14	200	300	300	398	1,010	1,460	4,650	2,050	655	260	156	960
15	200	285	300	415	950	1,220	4,020	1,950	615	254	156	745
16	210	270	300	380	775	1,220	3,730	1,770	575	254	168	448
17	210	255	380	380	1,220	1,220	3,730	1,680	555	254	186	325
18	210	255	380	415	950	2,120	3,870	1,590	535	247	180	279
19	210	255	345	475	830	5,820	3,870	1,590	518	241	168	254
20	210	255	345	415	775	3,450	3,870	1,510	500	241	162	234
21	210	255	330	398	775	2,920	4,330	1,430	500	234	162	234
22	210	255	330	380	1,080	2,800	4,820	1,430	482	234	156	222
23	210	255	330	380	1,080	2,920	4,990	1,350	465	228	151	228
24	210	255	315	362	1,460	3,050	4,650	1,350	448	222	145	228
25	210	270	315	345	1,080	6,000	4,490	1,280	430	222	145	228
26	210	270	630	345	890	11,300	4,170	1,210	412	222	139	228
27	210	270	1,920	345	830	9,980	3,730	1,210	395	216	134	216
28	210	285	950	345	775	7,610	3,460	1,140	378	210	134	216
29	210	285	675	315	.....	6,820	3,460	1,080	360	210	134	430
30	210	285	562	330	.....	6,250	3,460	1,020	360	198	134	465
31	210	.....	495	315	.....	6,440	.....	1,020	.....	192	129	.....

Monthly discharge of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	210	200	207	12,700
November	415	210	270	16,100
December	1,920	300	511	31,400
January	475	315	379	23,300
February	4,180	285	1,130	62,800
March	11,300	725	3,130	192,000
April	8,020	3,330	4,490	267,000
May	3,730	1,020	2,040	125,000
June	960	360	641	38,100
July	342	192	258	15,900
August	192	129	161	9,900
September	960	129	278	16,500
The year	11,300	129	1,120	811,000

SOUTH FORK OF FEATHER RIVER AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., 800 feet above mouth of Powell Creek, and half a mile above highway bridge at Enterprise, Butte County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1918.

GAGE.—Inclined staff bolted to ledge on right bank; read by Agnes Parks Alm. Original gage was 150 feet below; consisted of two vertical sections on left bank; read until November 8, 1913. Original datum maintained.

DISCHARGE MEASUREMENTS.—Made from cable 90 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet February 6 (discharge, 1,460 second-feet); minimum stage recorded, 2.5 feet August 21–24 (discharge, 0.3 second-foot).

1911–1918: Maximum stage recorded, 12.05 feet February 25, 1917 (discharge, from extension of rating curve, 10,600 second-feet); minimum stage recorded, 2.45 feet August 11, 1917 (discharge, 0.2 second-foot).

DIVERSIONS.—The diversion dam of the Palermo Land & Water Co.'s canal is 1 mile above the station. The South Feather Land & Water Co.'s canal diverts from Lost and Pinkard creeks above the station. This water is used for irrigation in the vicinity of Wyandotte and Bangor.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 6. Rating curves fairly well defined below 800 second-feet and extended above. They coincide at discharge of 1,460 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records considered good except those for extreme high water, which are fair.

Discharge measurements of South Fork of Feather River at Enterprise, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 6	4.46	436
July 21	2.62	1.0

Daily discharge, in second-feet, of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	1.5	227	80	44	118	790	500	84	0.8	0.8	0.6
2	1.5	1.5	99	80	44	118	790	500	74	.8	.8	.8
3	.5	1.5	80	63	44	118	690	500	57	.8	.8	.8
4	.5	1.5	38	63	49	145	550	525	57	.5	.8	.8
5	.5	1.5	38	63	80	145	525	475	50	.8	.8	.8
6	.5	63	38	63	1,840	118	500	405	50	.8	.8	.8
7	.5	63	38	63	605	145	605	405	50	.8	.8	.8
8	.5	18	32	49	238	205	550	382	50	.8	.8	.8
9	.5	18	32	49	238	174	850	382	38	.8	.8	.8
10	.5	18	32	49	174	205	1,060	382	33	.8	.8	.8
11	.5	18	27	49	145	790	990	315	28	.8	.8	.8
12	.5	32	27	49	145	550	885	315	23	.8	.8	6
13	.5	27	27	49	174	632	850	275	23	.8	.8	151
14	1.5	22	27	63	205	315	730	275	23	.8	.8	174
15	1.5	22	27	63	145	238	660	238	15	.8	.8	74
16	1.5	18	27	63	145	205	605	238	15	.8	.8	23
17	1.5	18	63	63	174	205	605	205	8	.8	.8	15
18	1.5	18	63	63	132	730	632	205	8	.8	.8	15
19	1.5	18	63	63	106	1,130	605	205	3.5	.8	.6	15
20	1.5	18	49	63	94	660	660	205	3.5	.8	.6	8
21	1.5	18	49	63	94	605	660	174	3.5	.8	.3	8
22	1.5	18	49	63	238	550	730	160	3.5	.8	.3	8
23	1.5	18	27	63	238	525	730	145	3.5	.8	.3	8
24	1.5	18	27	63	295	450	730	145	2.2	.8	.3	8
25	1.5	18	27	63	238	1,060	660	145	2.2	.8	.6	8
26	1.5	18	99	49	205	1,130	632	118	.8	.8	.6	8
27	1.5	18	295	49	145	1,460	605	118	.8	.8	.6	8
28	1.5	18	260	44	145	990	578	94	.8	.8	.6	8
29	1.5	22	227	44	.....	820	550	94	.6	.8	.6	43
30	1.5	27	167	44	.....	850	525	84	.6	.8	.6	23
31	1.5	.....	167	44	.....	790	.....	84	.....	.8	.6	.....

Monthly discharge of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.5	0.5	1.15	70.7
November	63	1.5	19.7	1,170
December	295	27	80.3	4,940
January	80	44	58.0	3,570
February	1,840	44	229	12,700
March	1,460	118	522	32,100
April	1,060	500	684	40,700
May	525	84	268	16,500
June	84	.6	23.7	1,410
July	.8	.8	.80	49.2
August	.8	.3	.68	41.8
September	174	.6	20.7	1,230
The year	1,840	.3	158	114,000

PALERMO LAND & WATER CO.'S CANAL AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., 1,000 feet above Alm's residence at Enterprise, Butte County, and three-fourths mile below intake at diversion dam on South Fork of Feather River.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1919.

GAGE.—Vertical staff installed April 13, 1915 (readings began Apr. 14), on right wall on concrete approach to sheet-iron flume; read by Agnes Parks Alm. Original gage, which was read up to March 31, 1914, and also from March 15 to April 13, 1915, during rebuilding of flume just above it, was vertical staff fastened to post on right bank about one-fourth mile below. Datum of this gage was lowered 1.00 foot November 9, 1913, From April 1, 1914, to March 14, 1915, readings were taken from a gage installed March 22, 1914, in the flume, about 800 feet above old gage. Relations between the three gages used have not been determined.

DISCHARGE MEASUREMENTS.—Made from foot plank at gage.

CHANNEL AND CONTROL.—Control is throat of concrete approach to metal flume. Control at original station is a stretch of channel which is gravel and sand. Control at original station is a stretch of channel which is gravel and sand. Control for gage in the old wooden flume was also a stretch of channel.

EXTREMES OF DISCHARGE.—1911–1918: Maximum discharge recorded, 41 second-feet June 17, 1918; no flow during periods of every year.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

This canal furnishes water for irrigation below Oroville.

Discharge measurements of Palermo Land & Water Co.'s canal at Enterprise, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 6	2.00	28
6	2.12	32
July 21	1.68	21

Daily discharge, in second-feet, of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	24	7.6	9.8	12.5	20	16.6	28	40	31	17.6	15.2
2	26	24	9.8	9.8	12.5	20	16.6	28	40	30	17.6	15.4
3	25	25	9.5	9.8	15.3	20	16.6	28	40	30	17.6	15.0
4	24	26	9.5	9.8	20	20	16.6	28	40	29	17.2	14.8
5	24	23	9.5	9.8	21	20	16.6	28	40	28	17.6	15.2
6	24	19.0	9.5	9.8	11.4	20	16.4	32	40	28	17.2	15.2
7	24	19.0	9.5	9.8	11.3	17.7	16.6	32	40	26	16.8	15.4
8	24	19.0	9.4	9.8	25	10.1	16.4	32	40	26	16.8	15.6
9	24	19.0	9.4	9.8	25	10.1	16.8	32	40	27	16.8	16.0
10	24	19.0	9.5	9.6	25	10.1	16.8	32	40	26	16.8	16.4
11	24	18.5	9.5	9.6	25	11.1	16.8	35	40	26	16.6	16.4
12	24	18.3	9.5	9.6	24	10.9	16.8	35	40	25	16.4	22
13	24	18.3	9.5	9.6	25	9.2	16.8	38	40	25	16.4	22
14	24	18.3	9.5	9.8	25	8.3	16.6	38	41	24	16.4	7.6
15	24	18.3	9.5	9.8	25	4.6	16.6	38	40	24	17.2	11.7
16	24	18.3	9.5	9.8	18.7	3.4	16.6	37	40	24	18.5	18.1
17	25	18.5	9.5	9.8	6.4	8.5	16.6	37	41	23	18.3	17.6
18	24	18.5	9.5	9.8	6.4	11.9	16.6	37	40	23	18.5	17.6
19	24	18.3	9.5	9.6	14.8	12.8	18.5	37	40	22	18.1	17.6
20	24	18.3	9.5	9.6	14.8	3.2	24	39	39	22	16.4	17.6
21	24	18.3	9.5	9.6	15.2	3.1	24	39	39	21	16.4	17.6
22	24	18.1	9.5	9.8	15.4	12.3	27	39	39	21	16.2	18.1
23	24	18.1	9.4	9.8	15.4	7.0	28	39	37	20	16.2	18.1
24	24	18.1	9.4	9.8	15.6	14.8	28	39	38	21	15.9	18.1
25	24	18.3	9.4	9.6	15.2	15.6	28	39	38	20	15.2	18.1
26	24	18.3	9.5	9.6	20	14.1	28	39	37	20	15.2	17.6
27	24	18.3	9.8	11.2	20	13.2	28	39	36	20	15.2	17.6
28	24	18.3	9.8	12.1	20	12.8	28	39	35	19.4	15.2	17.6
29	23	18.3	9.5	12.1	.....	15.5	28	38	33	18.5	15.2	18.1
30	24	15.2	9.5	12.1	.....	16.4	28	38	32	18.5	14.8	18.1
31	24	.....	9.5	12.5	.....	17.0	.....	39	.....	17.9	14.6	.....

Monthly discharge of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	26	23	24.2	1,490
November	26	15.2	19.3	1,150
December	9.8	7.6	9.45	581
January	12.5	9.6	10.1	621
February	25	6.4	17.9	994
March	20	3.1	12.7	781
April	28	16.4	20.6	1,230
May	39	28	35.4	2,180
June	41	32	38.8	2,310
July	31	17.9	23.8	1,460
August	18.5	14.6	16.6	1,020
September	22	7.6	16.7	994
The year	41	3.1	20.4	14,800

MIDDLE FORK OF YUBA RIVER[1] NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., below highway bridge at Freeman's Crossing, in Tahoe National Forest, 1¼ miles northeast of North San Juan, Nevada County. Oregon Creek enters three-fourths mile above, Moonshine Creek one-fourth mile below, and North Fork of Yuba River 4 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 27, 1910, to September 30, 1918.

GAGE.—Vertical staff wedged between two large boulders on right bank one-fourth mile below bridge; read by Henry Zurhorst.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.2 feet March 27 (discharge, 2,270 second-feet); minimum stage recorded, 4.3 feet August 28 to September 9 (discharge, 32 second-feet).

1910–1918: Maximum stage recorded, 11.7 feet at 10 a. m. May 12, 1915 (discharge, 14,300 second-feet); minimum stage recorded, 4.30 feet August 28 to September 9, 1918 (discharge, 32 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since May 13, 1915. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to table. Records excellent.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 3	4.42	44
Sept. 27	4.47	52

[1] Known locally as Middle Yuba River.

Daily discharge, in second-feet, of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	46	46	380	90	62	169	1,130	1,130	435	68	41	32
2	46	46	162	78	78	198	1,130	1,240	424	62	41	32
3	46	50	102	74	74	206	800	1,130	435	62	41	32
4	46	46	83	68	74	282	650	1,240	435	58	41	32
5	46	46	78	68	83	238	615	930	435	58	41	32
6	43	78	68	68	1,480	218	550	930	408	58	41	32
7	43	58	62	68	760	340	685	980	408	55	38	32
8	43	58	58	68	355	408	615	980	391	55	38	32
9	43	58	58	68	206	306	1,610	760	380	55	38	32
10	43	46	58	68	230	292	1,920	615	408	55	34	34
11	43	55	58	62	198	1,240	1,480	550	330	55	41	34
12	43	83	58	83	180	306	1,360	615	320	50	38	74
13	46	55	58	108	292	550	1,130	685	282	50	38	191
14	43	58	58	102	206	408	930	650	260	55	38	490
15	46	58	58	90	206	380	840	615	206	50	38	162
16	43	55	58	83	191	340	760	582	191	50	43	102
17	46	58	78	83	282	340	760	550	169	50	43	74
18	55	55	78	102	198	550	840	550	162	46	43	58
19	50	55	74	90	169	1,760	840	550	162	46	43	58
20	50	55	62	83	180	840	980	550	146	46	38	55
21	46	50	62	78	198	685	1,130	550	136	46	38	50
22	46	55	62	78	355	615	1,240	550	130	43	34	58
23	46	55	58	78	408	615	1,360	550	124	43	34	62
24	46	50	58	78	550	615	1,240	550	116	43	34	58
25	46	55	58	74	306	1,540	1,130	550	102	43	34	55
26	46	55	136	74	260	2,090	1,080	490	102	43	34	55
27	46	55	292	62	229	2,270	930	408	90	43	34	50
28	46	58	146	62	198	1,300	930	380	83	43	32	50
29	46	58	108	68	.....	1,030	1,030	330	78	43	32	97
30	46	55	90	68	.....	1,030	1,030	380	78	41	32	55
31	46	.....	78	74	.....	1,130	.....	435	.....	41	32	.....

Monthly discharge of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	55	43	45.7	2,810
November	83	46	55.5	3,300
December	380	58	93.5	5,750
January	108	62	77.4	4,760
February	1,480	62	286	15,900
March	2,270	169	719	44,200
April	1,920	550	1,020	60,700
May	1,240	330	678	41,700
June	435	78	248	14,800
July	68	41	50.2	3,090
August	43	32	37.6	2,310
September	490	32	73.7	4,390
The year	2,270	32	282	204,000

YUBA RIVER AT SMARTSVILLE, CALIF.

LOCATION.—In sec. 22, T. 16 N., R. 6 E., at Narrows, 1 mile north of Smartsville, Yuba County, 1 mile below mouth of Deer Creek, 6½ miles below mouth of South Fork, 7 miles above mouth of Dry Creek, and 18 miles above junction with Feather River.

DRAINAGE AREA.—1,220 square miles.

RECORDS AVAILABLE.—June 2, 1903, to September 30, 1918.

GAGE.—Staff in three sections, bolted to solid rock on left bank, read by Joseph French. On account of the gradual erosion of the channel, gage datum was lowered 10 feet August 1, 1906. Before the change, first section was vertical and driven into gravel near left bank 50 feet below cable; second section was painted on rock ledge on left bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. As the result of extensive hydraulic mining in the early days the channel has been filled with an enormous quantity of tailings. At the station, the depth of mining débris is estimated to be more than 80 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.7 feet February 6 and March 19 (discharge, 13,100 second-feet); minimum stage recorded, 1.54 feet August 28–30 (discharge, 162 second-feet).

1903–1918: Maximum stage recorded, 28.3 feet January 15, 1909 (discharge, 111,000 second-feet); minimum stage recorded, 1.54 feet August 28–30, 1918 (discharge, 162 second-feet). Bed of stream is being eroded so that stage becomes lower each year.

DIVERSIONS.—Water is diverted for power and irrigation above the station. See next paragraph.

REGULATION.—Lake Spaulding, and several small glacial lakes near the headwaters of the South Fork of Yuba River are utilized as storage reservoirs. A part of this water is diverted into the Bear River drainage basins.

ACCURACY.—Stage-discharge relation changed during high water of February 6 and September 14. Rating curves well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Yuba River near Smartsville, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	J. F. Kunesh	2.02	248	July 19	Charles Leidl	1.98	298
Mar. 7	Charles Leidl	4.39	2,130	Sept. 26	J. F. Kunesh	2.15	323
May 4	....do	6.19	4,790				

Daily discharge, in second-feet, of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	276	226	3,110	438	417	1,250	5,770	4,840	2,140	432	192	178
2	313	210	955	417	460	1,340	5,580	4,840	2,270	432	178	178
3	313	226	915	396	396	1,390	4,670	4,840	2,400	410	178	178
4	294	242	482	396	375	1,440	4,180	4,500	2,400	388	178	178
5	276	276	438	375	482	1,300	3,550	4,500	2,400	388	178	178
6	313	417	417	396	13,100	1,040	3,550	4,670	2,270	388	178	192
7	276	334	375	438	4,840	3,860	4,180	4,340	2,140	367	178	222
8	242	276	396	460	2,400	2,530	3,860	5,020	2,020	388	178	206
9	242	259	354	438	1,500	1,900	9,380	4,180	1,900	367	178	237
10	242	313	375	417	1,250	4,180	8,180	3,700	1,660	346	178	237
11	242	276	354	396	1,080	6,150	7,120	3,250	1,550	326	178	254
12	242	438	354	438	1,300	7,960	6,340	3,250	1,390	306	178	367
13	226	417	354	560	1,780	3,860	5,960	3,860	1,250	306	178	1,340
14	242	313	334	587	1,550	2,950	5,200	4,180	1,120	306	165	3,100
15	242	313	334	507	1,340	2,670	4,500	3,860	1,010	306	165	1,900
16	242	294	354	460	1,160	2,400	4,180	3,400	940	306	178	580
17	242	276	460	438	3,100	2,400	4,180	3,250	870	306	192	458
18	242	294	482	482	1,660	3,100	4,340	3,100	810	306	206	390
19	242	313	396	560	1,390	13,100	4,500	2,950	720	306	192	345
20	242	313	354	482	1,250	5,200	4,840	2,950	662	270	178	325
21	242	313	354	532	1,500	4,020	5,390	3,250	690	270	178	325
22	259	313	354	460	2,530	3,860	6,340	3,250	635	270	178	305
23	242	294	334	438	4,180	3,550	5,580	3,550	580	270	165	325
24	226	276	354	438	3,400	3,700	5,390	3,250	608	270	165	325
25	226	276	438	417	2,400	6,340	5,200	3,100	580	270	165	305
26	210	334	770	438	1,900	9,640	4,840	2,950	555	270	165	270
27	210	313	2,280	438	1,550	9,380	4,840	2,950	530	237	165	270
28	242	354	878	417	1,390	6,530	4,670	2,400	505	237	165	345
29	242	375	675	396	.....	5,580	4,500	1,780	480	237	165	530
30	242	334	560	375	.....	5,390	4,500	1,900	456	206	165	505
31	242	.....	482	396	.....	5,580	.....	1,900	.....	206	165	.....

Monthly discharge of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	313	210	251	15,400
November	438	210	307	18,300
December	3,110	334	615	37,800
January	587	375	446	27,400
February	13,100	375	2,130	118,000
March	13,100	1,040	4,310	265,000
April	9,380	3,550	5,180	308,000
May	5,020	1,780	3,540	218,000
June	2,400	456	1,250	74,400
July	432	206	313	19,200
August	206	165	176	10,800
September	3,100	178	485	28,900
The year	13,100	165	1,580	1,140,000

OREGON CREEK NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., below highway bridge in Tahoe National Forest, 500 feet above junction with Middle Fork of Yuba River, half a mile above Freeman's Crossing, Yuba County, and 2 miles northeast of North San Juan, Nevada County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on right bank 150 feet below bridge; read by H. Zurhorst.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 9 a. m. March 27 (discharge, 585 second-feet); minimum stage recorded, 3.58 feet August 30 to September 1 (discharge, 1.8 second-feet).

1910–1918: Maximum stage recorded, 8.5 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 4,080 second-feet); minimum stage recorded, 3.70 feet September 13 to 20, 1913 (discharge, 2 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve fairly well defined below 100 second-feet and extended above. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Oregon Creek near North San Juan, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 3	3.63	2.4
Sept. 27	3.80	5.3

Daily discharge, in second-feet, of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.6	3.6	65	6.5	5	32	235	54	7.5	3.3	2.3	1.8
2	2.6	3.6	8.5	6	6	38	195	51	7.5	3.3	2.3	2.0
3	2.3	3.6	6.5	5.5	5.5	41	155	51	7.5	3.6	2.3	2.0
4	2.3	3.6	6.5	5.5	5	51	122	48	7	3.6	2.3	2.0
5	2.3	3.6	6	5	7	41	100	41	6.5	3.3	2.3	2.0
6	2.3	6.5	5.5	5	385	48	100	44	6.5	3.3	2.3	2.0
7	2.6	5	5	5	122	76	155	44	6.5	3.3	2.3	2.0
8	2.6	5	5	5	58	44	122	36	6.5	3.3	2.3	2.0
9	2.6	5	5	5	38	26	195	38	8	3.0	2.3	2.3
10	3.0	5	5	5.5	26	94	320	32	6.5	3.0	2.3	2.3
11	3.0	5	5	5.5	15	[a] 270	235	26	6	3.0	2.3	2.0
12	3.0	6.5	5	7.5	8.5	148	195	26	6	3.0	2.3	6.5
13	3.0	6	5	8	51	148	195	24	6	3.0	2.3	26
14	3.0	5	5	8.5	38	91	155	24	5.5	3.0	2.0	65
15	3.0	5	5	6.5	15	79	129	15	5.5	2.6	2.0	10
16	3.0	5	5	6.5	8.5	72	108	15	5.5	2.6	3.3	7
17	3.3	5	6.5	6.5	38	68	100	15	5.5	3.0	3.3	6.5
18	3.3	5	6	7	28	129	94	15	5.5	3.0	3.3	6
19	3.3	5	5.5	7.5	20	445	94	15	5	3.0	3.3	5.5
20	3.3	5	5.5	7	15	235	94	15	5	3.0	3.0	5
21	3.3	5	5	6.5	24	155	91	14	5	3.0	3.0	5
22	3.3	5	5	6.5	65	148	94	14	5	3.0	3.0	5.5
23	3.3	5	5	6.5	76	148	94	10	5	2.3	2.3	6
24	3.3	5	5	6.5	122	129	62	10	4.7	3.0	2.3	6
25	3.3	5	5	6	65	445	79	10	4.7	3.0	2.0	5.5
26	3.3	5	15	5	51	510	79	8.5	5	2.6	2.0	5.5
27	3.6	5	38	6	[b] 44	585	68	10	5	2.6	2.0	5.5
28	3.6	5	8.5	6	38	358	65	10	4.2	3.0	2.0	5
29	3.6	5	8	6	.....	280	65	7.5	4.2	3.0	2.0	7.5
30	3.6	5	7	6	.....	244	65	7.5	3.3	2.6	1.8	6.5
31	3.6	.....	6.5	5	.....	235	.....	7.5	.....	2.3	1.8	.....

[a] No gage-height record; discharge estimated from record of flow of Goodyear Creek at Rock Creek at Goodyear Bar.

[b] No gage-height record; discharge interpolated.

Monthly discharge of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.6	2.3	3.04	187
November	6.5	3.6	4.90	292
December	65	5	9.02	555
January	8.5	5	6.15	378
February	385	5	49.3	2,740
March	585	26	175	10,800
April	320	65	129	7,680
May	54	7.5	23.8	1,460
June	8	3.3	5.72	340
July	3.6	2.3	2.99	184
August	3.3	1.8	2.40	148
September	65	1.8	7.26	432
The year	585	1.8	34.7	25,200

NORTH FORK OF YUBA RIVER[1] AT GOODYEAR BAR, CALIF.

LOCATION.—In E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in Tahoe National Forest, at highway bridge at Goodyear Bar, Sierra County. Rock Creek and Goodyear Creek enter one-eighth and one-fourth mile, respectively, below station; and North Fork of North Fork of Yuba River enters at Downieville, 4 miles above.

DRAINAGE AREA.—214 square miles.

RECORDS AVAILABLE.—October 31, 1910, to September 30, 1918.

GAGE.—Vertical staff in two sections on left bank; low-water section fastened to old piling under bridge; upper section bolted to left abutment of bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, or by wading.

CHANNEL AND CONTROL.—Solid rock, small boulders, and gravel; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet April 9 (discharge, 2,790 second-feet); minimum stage recorded, 3.1 feet August 8–17, and August 24 to September 1 (discharge, 109 second-feet).

1910–1918: Maximum stage recorded, 11.5 feet at 5.40 p. m. May 11, 1915 (discharge, 12,600 second-feet): minimum stage recorded, 3.1 feet August 8 to 17 and August 24 to September 1, 1918 (discharge, 109 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined below 4,000 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	3.25	146
Sept. 28	3.35	170

[1] Known locally as North Yuba River.

Daily discharge, in second-feet, of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	146	133	460	176	160	235	1,130	1,820	a730	227	146	109
2	146	133	227	176	160	268	1,050	1,600	722	227	146	121
3	146	133	192	176	160	290	895	1,710	722	210	133	121
4	146	133	192	176	160	312	825	1,600	690	210	133	133
5	133	160	160	176	160	290	755	1,500	690	210	133	133
6	133	160	160	176	2,050	336	755	1,600	690	192	121	133
7	133	160	160	176	630	460	790	1,600	690	192	121	133
8	133	160	160	160	359	359	b770	1,310	690	192	109	133
9	133	160	160	160	359	312	2,790	1,130	690	192	109	133
10	133	160	146	160	336	408	1,600	970	a656	192	109	133
11	133	160	146	160	312	755	b1,400	895	a623	192	109	133
12	133	210	146	210	312	570	b1,300	1,130	a589	176	109	312
13	133	160	146	210	312	460	1,220	a1,110	a556	176	109	460
14	133	160	146	210	336	408	1,050	a1,080	a522	176	109	434
15	133	160	146	176	290	359	970	a1,060	488	176	109	227
16	133	133	146	176	268	384	970	a1,040	460	176	109	192
17	133	133	146	176	312	384	1,010	a1,020	408	176	109	176
18	133	133	146	227	268	970	1,050	a990	408	160	121	160
19	133	133	146	176	268	312	1,130	970	384	160	121	160
20	133	133	146	160	248	630	1,220	970	a372	160	133	160
21	133	133	160	a160	268	570	1,310	970	359	160	133	a156
22	133	133	160	a160	312	570	1,820	970	336	160	121	a153
23	133	133	160	a165	408	600	1,710	932	312	146	121	a150
24	133	133	160	a165	359	630	1,600	895	290	146	109	146
25	133	133	176	a170	290	1,400	1,500	895	290	146	109	146
26	133	133	570	a170	268	1,930	1,310	825	268	146	109	149
27	133	133	359	176	268	1,400	1,310	755	268	146	109	146
28	133	133	268	160	248	1,050	1,310	755	a258	146	109	192
29	133	133	227	160	.....	1,010	1,400	755	a248	146	109	192
30	133	176	192	160	.....	1,130	1,500	a747	a237	146	109	160
31	133	.....	176	160	.....	1,130	.....	a739	.....	146	109	.....

aGage not read; discharge interpolated.
bGage not read; discharge estimated from record of flow of Middle Fork of Yuba River at North San Juan.

Monthly discharge of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	146	133	135	0.631	0.73	8,300
November	210	133	146	.682	.76	8,690
December	570	146	196	.916	1.06	12,100
January	227	160	174	.813	.94	10,700
February	2,050	160	353	1.65	1.72	19,600
March	1,930	235	643	3.01	3.47	39,500
April	2,790	755	1,250	5.84	6.52	74,400
May	1,820	739	1,110	5.19	5.98	68,300
June	730	237	488	2.28	2.54	29,000
July	227	146	174	.813	.94	10,700
August	146	109	118	.551	.64	7,260
September	460	109	176	.822	.95	10,500
The year	2,790	109	413	1.93	26.25	299,000

NORTH FORK OF NORTH FORK OF YUBA RIVER[1] AT DOWNIEVILLE, CALIF.

LOCATION.—In NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., at upper highway bridge in Downieville, Sierra County, 500 feet above dam and one-fourth mile above junction with North Fork of Yuba River. East Fork of North Fork enters one-eighth mile above and Middle Fork of North Fork 1¼ miles above station.

DRAINAGE AREA.—71.2 square miles.

RECORDS AVAILABLE.—November 1, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to right abutment of bridge; read by J. T. Mason.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and small boulders. Since flood of May 11, 1915, control is the dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet February 6 and April 9 (discharge, 1,140 second-feet); minimum stage recorded, 3.0 feet September 1–12 (discharge, 32 second-feet).

1911–1918: Maximum stage recorded, 8.0 feet at 5 p. m. May 11, 1915 (discharge, from extension of rating curve, about 6,760 second-feet); minimum stage recorded, 3.0 feet September 1–12, 1918 (discharge, 32 second-feet).

ICE.—Stage-discharge relation slightly affected by ice for short periods in severe winters.

DIVERSIONS.—The intake of the municipal water system of Downieville is above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation dependent on the presence and height of flashboards on the dam and on the operation of the power plant which diverts water between the gage and dam. Observer has been instructed to read the gage when plant is not running. It is usually shut down between 7.30 a. m. and 4.30 p. m. Flashboards 18 inches high and 24 inches high were used this year. Rating curve for 18-inch boards fairly well defined. Gage read to half-tenths (sometimes hundredths), twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, after making proper correction for height of flashboard. Records fair.

COOPERATION.—Gage-height record furnished by John T. Mason.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 4	2.67	54
Sept. 28	3.15	78
Sept. 29	3.14	74

[1] Known locally as North Fork of North Yuba River.

Daily discharge, in second-feet, of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	52	162	68	60	79	350	510	180	60	48	32
2	60	52	63	68	60	79	350	650	180	60	46	32
3	60	52	60	68	60	79	295	615	180	60	46	32
4	57	52	60	68	60	79	245	545	180	60	46	32
5	55	57	60	60	60	79	245	580	180	60	44	32
6	55	90	60	60	900	79	245	545	180	60	44	32
7	55	75	60	60	180	115	245	475	162	60	44	32
8	55	75	60	60	115	102	245	475	162	60	44	32
9	55	57	60	60	98	102	855	350	145	60	44	32
10	55	52	60	60	90	102	650	338	130	60	44	32
11	55	60	60	60	90	220	580	320	130	60	44	32
12	55	68	60	60	90	145	545	320	115	52	44	60
13	55	60	60	60	90	130	380	320	115	52	44	108
14	55	60	57	60	90	130	350	320	102	52	44	362
15	55	60	55	60	79	115	350	350	102	52	44	108
16	55	52	57	60	79	102	350	305	83	52	44	90
17	55	52	57	60	79	102	350	305	79	52	44	68
18	55	52	55	60	79	270	350	255	79	52	44	68
19	55	60	52	60	79	255	350	245	79	52	44	68
20	55	60	52	60	79	115	350	270	79	50	44	68
21	55	60	52	60	79	145	510	295	79	50	44	68
22	55	60	52	60	79	145	730	270	79	50	44	60
23	52	60	52	60	98	162	580	265	79	50	44	60
24	52	60	52	60	98	200	615	255	79	49	37	60
25	52	60	52	60	79	580	545	255	68	49	37	52
26	52	60	162	60	79	990	475	220	68	49	37	52
27	52	60	130	60	79	475	440	220	68	49	37	52
28	52	60	75	60	79	380	440	192	68	49	37	65
29	52	60	68	60	.....	380	510	180	68	48	37	79
30	52	60	68	60	.....	350	510	180	68	48	37	65
31	52	.....	60	60	.....	350	.....	180	.....	48	37	.....

NOTE.—18-inch flashboards on dam Oct. 1 to Aug. 15; 24-inch flashboards on dam Aug. 15 to Sept. 13 and Sept. 16 to 30. Flashboards partly destroyed Sept. 14–16.

Monthly discharge of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 71.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	60	52	54.7	0.768	0.89	3,360
November	90	52	59.9	.841	.94	3,560
December	162	52	67.5	.948	1.09	4,150
January	68	60	61.0	.857	.99	3,750
February	900	60	114	1.60	1.67	6,330
March	990	79	214	3.01	3.47	13,200
April	855	245	434	6.10	6.81	25,800
May	650	180	342	4.80	5.53	21,000
June	180	68	112	1.57	1.75	6,660
July	60	48	53.7	.754	.87	3,300
August	48	37	42.5	.597	.69	2,610
September	362	32	65.5	.920	1.03	3,900
The year	990	32	135	1.90	25.73	97,600

ROCK CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at footbridge at Goodyear Bar, Sierra County, in Tahoe National Forest. Woodruff Creek enters 350 feet above station, and Rock Creek joins North Fork of Yuba River 600 feet below.

DRAINAGE AREA.—10.8 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on right bank 40 feet below bridge, read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet April 9 (discharge, 215 second-feet); minimum stage recorded, 1.05 feet August 4 to 9, 24 and 25 (discharge, 0.3 second-foot).

1910–1918: Maximum stage recorded, 7.0 feet at 3.30 p. m., December 31, 1913 (discharge, from extension of rating curve, about 820 second-feet); minimum stage recorded, 0.95 foot July 18, 19, 23, and 24, 1917, and 1.05 feet August 4 to 9, 24 and 25, 1918 (discharge, 0.3 second-foot).

DIVERSIONS.—Three small ditches, having a total capacity of about 10 second-feet, head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly at low water. Rating curves well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Rock Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	1.11	1.2
Sept. 28	1.33	2.6

Daily discharge, in second-feet, of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.4	1.8	9	2.6	2.6	12	106	62	7.5	0.6	0.4	0.4
2	1.1	1.8	4.1	3.4	2.6	15	83	62	7.5	.4	.4	.4
3	1.1	1.8	4.1	2.6	2.6	17	73	52	7.5	.8	.4	.4
4	1.1	1.8	2.6	2.6	2.6	20	63	48	6	.8	.3	.4
5	1.8	2.6	2.6	2.6	4.1	15	54	43	4.5	.6	.3	.4
6	1.1	2.6	2.6	2.6	94	17	54	43	4.5	.4	.3	.4
7	1.1	2.6	2.6	2.6	38	38	63	35	4.5	.4	.3	.4
8	1.1	2.6	2.6	1.8	17	26	90	35	4.5	.4	.3	.4
9	1.1	2.6	2.6	1.8	12	17	215	35	3.2	.6	.3	.4
10	1.1	4.1	2.6	1.8	9	23	133	28	2.8	.4	.4	.4
11	1.1	4.1	2.6	1.8	9	133	115	28	2.4	.8	.4	.4
12	1.1	6	2.6	4.1	9	73	105	28	2.0	.6	.4	22
13	1.1	4.1	2.6	4.1	11	46	94	26	1.6	.4	.6	22
14	1.1	4.1	2.6	4.1	17	38	83	25	1.2	.4	.4	7.5
15	1.1	4.1	2.6	3.4	12	30	72	23	.8	.4	.4	4.5
16	1.1	3.4	2.6	3.4	11	26	72	21	.8	.8	.4	2.0
17	1.1	3.4	2.6	3.4	17	26	72	20	.8	.6	.4	2.0
18	1.1	3.4	2.6	5	12	180	72	18	.8	.6	.4	2.0
19	1.1	2.6	2.6	4.1	11	106	72	16	.8	.4	.4	2.0
20	1.1	2.6	1.8	4.1	9	73	83	14	.8	.4	.4	2.0
21	1.1	2.6	1.8	3.9	11	54	83	12	.8	.4	.4	2.0
22	1.1	2.6	1.1	3.7	17	54	94	12	.8	.4	.4	1.8
23	1.1	2.6	1.1	3.5	38	54	94	12	.8	.6	.4	1.6
24	1.1	2.6	1.1	3.3	38	54	83	12	.8	.6	.3	1.4
25	1.1	2.6	1.8	3.0	20	133	72	12	.8	.6	.3	1.4
26	1.8	2.6	17	2.8	17	180	62	12	.8	.6	.4	1.4
27	1.8	2.6	9	2.6	12	147	62	9.5	.8	.6	.4	1.4
28	1.8	2.6	4.1	2.6	12	106	62	9.5	.8	.4	.4	3.2
29	1.8	2.6	4.1	2.6	.....	94	62	7.5	.6	.4	.4	3.2
30	1.8	4.1	3.4	2.6	.....	106	62	7.5	.6	.4	.4	2.0
31	1.8	.....	2.6	2.6	.....	106	.....	7.5	.....	.4	.4	.....

NOTE.—Gage not read Jan. 21–26, Apr. 8, 11, 12, May 13–18, May 30 to June 1, June 10–14, 20, 28–30, and Sept. 22 and 23; discharge interpolated except that for Apr. 8, 11, 12, which was estimated from record of flow of Oregon Creek.

Monthly discharge of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.8	0.4	1.24	76.2
November	6	1.8	2.99	178
December	17	1.1	3.47	213
January	5	1.8	3.07	189
February	94	2.6	16.7	928
March	180	12	65.1	4,000
April	215	54	83.7	4,980
May	62	7.5	25.0	1,540
June	7.5	.6	2.40	143
July	.8	.4	.52	32.0
August	.6	.3	.38	23.4
September	22	.4	2.99	178
The year	215	.3	17.2	12,500

GOODYEAR CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at trail bridge in Tahoe National Forest, 300 feet above junction with North Fork of Yuba River and half a mile north of Goodyear Bar, Sierra County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on left bank 200 feet above bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.7 feet April 9 (discharge, 276 second-feet); minimum stage recorded, 1.30 feet August 24 to 31 (discharge, 1.2 second-feet).

1910–1918: Maximum stage recorded, 7.0 feet at 3 p. m. December 31, 1913 (discharge, from extension of rating curve, about 1,460 second-feet); minimum stage recorded, 1.30 feet August 24 to 31, 1918 (discharge, 1.2 second-feet).

DIVERSIONS.—Three small irrigation ditches, having a total capacity of about 7½ second-feet, head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 9. Rating curves fairly well defined between 2 and 200 second-feet. Gage read to half-tenths feet once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Goodyear Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	1.37	3.2
Sept. 28	1.57	7.9

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SAN FRANCISCO, CALIF.

Daily discharge, in second-feet, of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.0	3.0	26	8	8	26	158	94	17	5	2.8	2.0
2	4.0	3.0	12	8	8	34	131	94	15	4.0	2.8	2.0
3	4.0	3.0	12	8	8	34	118	94	12	2.8	2.8	2.8
4	4.0	3.0	8	8	8	43	106	94	9	1.2	2.8	2.8
5	6	6	8	8	8	34	100	83	9	2.8	2.8	2.8
6	4.0	6	8	8	158	38	100	78	9	4.0	2.8	2.8
7	4.0	6	8	8	94	62	106	72	9	2.0	2.8	2.8
8	4.0	6	8	6	43	52	138	61	9	2.8	2.8	2.8
9	4.0	6	8	6	34	43	276	56	9	2.8	2.0	2.8
10	4.0	6	8	6	30	52	187	50	9	2.8	2.0	2.8
11	4.0	6	8	6	26	131	155	45	9	4.0	2.0	2.8
12	4.0	8	8	12	26	94	143	50	9	5	2.0	22
13	4.0	8	8	12	26	62	131	48	9	2.8	2.0	22
14	4.0	8	8	12	26	57	118	46	9	2.8	2.0	18
15	4.0	8	8	8	26	52	118	44	9	2.8	2.0	9
16	4.0	8	8	8	22	52	118	42	9	2.8	2.0	7
17	4.0	8	8	8	34	52	118	40	9	2.8	2.0	5
18	4.0	8	8	10	26	187	118	38	9	2.8	2.0	5
19	4.0	8	8	8	22	158	124	36	7	2.8	2.0	5
20	4.0	8	8	8	19	106	138	31	7	2.8	2.8	5
21	4.0	8	8	8	22	94	158	26	7	2.0	2.8	5
22	4.0	8	8	8	34	94	158	26	7	2.0	2.8	4.0
23	4.0	8	8	8	62	94	144	26	5	4.0	2.0	4.0
24	4.0	8	8	8	52	94	131	22	5	4.0	1.2	4.0
25	4.0	8	10	8	34	220	118	22	4.0	4.0	1.2	4.0
26	3.0	8	43	8	30	257	106	22	4.0	4.0	1.2	4.0
27	3.0	8	26	8	26	187	106	22	4.0	2.8	1.2	4.0
28	3.0	8	12	8	26	151	94	22	4.0	2.8	1.2	9
29	3.0	8	10	8	.....	151	94	22	4.0	2.8	1.2	7
30	3.0	12	8	8	.....	158	94	21	5	2.8	1.2	5
31	3.0	.....	8	8	.....	158	.....	19	.....	2.8	1.2	.....

NOTE.—Gage not read Jan. 21-26, May 13-18, May 30 to June 1, June 10-14, 20 28-30, and Sept. 21-23, discharge interpolated; April 8, 11, and 12, discharge estimated from record of flow of Oregon Creek.

Monthly discharge of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6	3.0	3.87	238
November	12	3.0	7.00	417
December	43	8	10.8	664
January	12	6	8.19	504
February	158	8	33.5	1,860
March	257	26	97.6	6,000
April	276	94	130	7,740
May	94	19	46.6	2,870
June	17	4.0	8.07	480
July	5	1.2	3.08	189
August	2.8	1.2	2.08	128
September	22	2.0	5.91	352
The year	276	1.2	29.6	21,400

BEAR RIVER AT VAN TRENT, CALIF.

LOCATION.—In SE. ¼ sec. 21, T. 14 N., R. 6 E., below highway bridge at McCourtney crossing, 1 mile below Van Trent, Placer County, and 8 miles above Wheatland.

DRAINAGE AREA.—263 square miles.

RECORDS AVAILABLE.—October 8, 1904, to September 30, 1918.

GAGE.—Staff in five sections on left bank 500 feet below bridge; read by Herman Ernestus.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage or by wading.

CHANNEL AND CONTROL.—Solid rock, boulders and gravel; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.8 feet at 8 a. m. March 19 (discharge, 4,930 second-feet); minimum stage recorded, 0.6 foot July 4 (discharge, 2 second-feet).

1904–1918: Maximum stage recorded, 18.9 feet at 8 a. m. January 14, 1909 (discharge, from extension of rating curve, about 29,600 second-feet); minimum stage recorded, 0.6 foot July 4, 1918 (discharge, 2 second-feet).

DIVERSIONS.—Water is diverted above station for power and irrigation. Stored water from South Fork of Yuba River is diverted into this drainage above the station at Colfax.

REGULATION.—A small amount of storage is developed on the headwaters of this stream. See also preceding paragraph.

ACCURACY.—Stage-discharge relation changed March 12. Rating curve used to March 12 well defined below 1,000 second-feet and extended above. Curve used after March 12 well defined below 400 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Bear River at Van Trent, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 7	Charles Leidl	2.08	168	July 19	Charles Leidl	0.81	8.4
May 4	do	1.78	198	Sept. 25	J. F. Kunesh	.91	14

Daily discharge, in second-feet, of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	20	152	28	24	120	380	184	127	18	22	13
2	12	17	130	33	38	100	340	179	168	8	22	8
3	20	20	90	28	28	90	380	174	90	5	13	8
4	17	24	65	33	20	72	302	168	114	2	13	5
5	14	20	50	38	28	90	321	70	114	5	22	6.5
6	50	178	33	28	552	110	340	90	102	5	8	18
7	28	44	28	20	1,370	215	515	114	114	8	22	13
8	20	38	33	28	335	795	425	168	90	5	13	13
9	24	33	28	33	140	445	470	200	102	5	8	5
10	17	38	20	28	140	335	1,060	232	80	13	5	5
11	20	28	24	24	65	2,980	660	232	80	8	5	5
12	20	24	20	28	50	2,980	560	200	90	13	5	13
13	24	140	28	110	190	1,830	660	232	114	13	5	184
14	20	44	24	44	178	940	470	249	102	13	5	232
15	24	28	20	72	152	660	425	154	70	13	5	70
16	9	20	28	50	130	560	380	232	90	12	8	29
17	20	24	50	44	995	660	321	140	61	13	8	22
18	17	20	38	38	485	710	266	114	70	8	8	22
19	24	24	33	44	245	4,930	200	114	90	8	8	13
20	17	28	28	33	305	1,550	168	168	70	8	8	22
21	28	24	28	38	552	1,000	302	140	90	8	5	13
22	24	20	24	33	1,870	1,000	232	200	70	8	5	22
23	12	24	28	28	795	820	227	200	90	5	8	22
24	14	28	20	33	1,140	710	222	200	52	8	8	13
25	12	24	24	28	575	765	216	140	90	8	8	13
26	17	20	28	24	305	880	211	140	70	13	5	13
27	17	24	38	28	190	1,270	206	90	36	5	8	18
28	14	28	44	20	152	820	200	168	13	20	5	24
29	28	24	38	28	.....	820	195	154	18	22	22	29
30	12	28	33	24	.....	635	190	168	13	8	13	22
31	17	.....	38	28	.....	560	.....	114	.....	29	22	.....

NOTE.—Gage not read Apr. 23 to May 3; discharge interpolated.

Monthly discharge of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	9	19.7	1,210
November	178	17	35.2	2,090
December	152	20	40.8	2,510
January	110	20	35.4	2,180
February	1,870	20	395	21,900
March	4,930	72	950	58,400
April	1,060	168	361	21,500
May	249	70	165	10,100
June	168	13	82.7	4,920
July	29	2.0	10.2	627
August	22	5	10.4	639
September	232	5	29.8	1,770
The year	4,930	2.0	177	128,000

BEAR RIVER CANAL NEAR COLFAX, CALIF.

LOCATION.—Just below lower spillway gates, 1 mile below diversion dam on Bear River and 2 miles northwest of Colfax, Placer County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Bristol water-stage recorder on left bank about 800 feet below the spillway gates; installed November 23, 1916. August, 1915, the gage was moved to right side of flume about 60 feet below spillway gates about 1 mile below original gage. Original gage was float in stilling box, 750 feet below headgate.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume. Control is a length of channel.

EXTREMES OF DISCHARGE.—1912–1918: Maximum daily discharge recorded, 256 second-feet June 3, 1917. Canal dry at times nearly every year.

COOPERATION.—Discharge record and some measurements furnished by Pacific Gas & Electric Co.

The water is used for power development and irrigation near Auburn.

Discharge measurements of Bear River canal near Colfax, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	J. F. Kumeah	3.51	113	Apr. 5	Pacific Gas & Electric Co	5.18	232
7	do	1.36	12.8				
Nov. 30	Pacific Gas & Electric Co	4.37	177	May 8	Charles Leidl	4.30	194
				9	Pacific Gas & Electric Co	5.42	252
30	do	5.26	236				
Jan. 28	do	1.88	42	11	do	5.39	249
Apr. 4	do	5.20	228	July 18	Charles Leidl	3.18	111

Daily discharge, in second-feet, of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	181	197	223	99	66	180	195	240	250	138	209	88
2	216	198	169	104	69	181	214	230	232	184	209	90
3	210	181	179	87	56	159	189	216	196	160	214	156
4	226	162	185	82	57	159	219	240	248	92	121	170
5	219	224	146	85	84	177	229	236	249	112	181	176
6	210	161	161	43	191	170	239	236	248	152	207	167
7	143	175	142	94	185	196	242	215	226	114	179	186
8	208	185	121	99	168	195	246	218	246	164	185	95
9	215	167	81	99	135	188	229	239	233	170	182	83
10	209	183	101	69	97	187	235	242	226	163	191	144
11	198	168	121	84	96	185	247	239	247	167	96	196
12	208	0	135	139	91	186	248	226	246	166	176	123
13	236	52	99	65	172	174	246	240	231	165	185	199
14	120	147	123	97	170	187	244	246	244	139	206	219
15	218	170	101	80	180	194	242	244	224	157	175	82
16	208	169	118	84	158	87	235	241	245	207	208	156
17	197	152	107	85	189	0	246	248	235	186	189	132
18	239	102	145	96	182	0	246	239	252	182	83	147
19	229	192	154	76	172	0	220	237	246	169	161	95
20	202	192	87	60	78	0	243	222	252	199	147	93
21	179	174	88	80	178	0	238	249	251	96	188	145
22	199	189	104	88	158	0	228	247	233	175	178	134
23	231	159	51	77	176	0	248	250	251	181	125	72
24	175	165	53	70	184	0	246	249	148	175	184	164
25	201	120	46	75	196	0	231	233	177	169	75	148
26	188	163	121	66	184	0	220	232	197	162	153	170
27	179	180	132	45	181	0	219	222	186	180	89	139
28	123	156	93	72	162	0	219	235	242	136	104	165
29	212	180	98	84	.....	0	217	246	192	156	177	76
30	126	176	88	92	.....	172	236	231	124	178	205	98
31	194	.....	131	71	.....	167	.....	224	.....	219	183	.....

Monthly discharge of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	239	120	197	12,100
November	224	0	161	9,580
December	223	46	119	7,320
January	139	43	82.2	5,050
February	196	56	143	7,940
March	196	0	101	6,210
April	248	189	232	13,800
May	250	215	236	14,500
June	252	124	226	13,400
July	219	92	162	9,960
August	214	75	167	10,300
September	219	72	137	8,150
The year	252	0	164	118,000

AMERICAN RIVER AND TRIBUTARIES.

NORTH FORK OF AMERICAN RIVER NEAR COLFAX, CALIF.

LOCATION.—In SW. ¼ sec. 30, T. 14 N., R. 10 E., at bridge on Colfax-Forest Hill road, 150 feet below mouth of Shirttail Canyon Creek, 5 miles southeast of Colfax, Placer County, and 11 miles above junction with Middle Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 16, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections: Section 1 bolted to ledge on left bank 30 feet below bridge; section 2 wedged in crevice on right bank 35 feet below bridge. From December 18, 1912, to August 16, 1914 a Gurley printing water-stage recorder was in operation on the right bank 50 feet below the bridge at the same datum. Gage read by H. P. Henning.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders—tailings from placer mining; shift during high water. Banks high, rocky, wooded, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.55 feet at 6.30 p. m. April 9 (discharge, 3,310 second-feet); minimum stage recorded, 2.1 feet November 5, August 12–15, August 20–September 12 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 16.0 feet during morning of January 1, 1914, determined by high-water mark on gage in recorder well (discharge, from extension of rating curve, about 23,000 second-feet); minimum stage recorded, 2.1 feet November 5, 1917, August 12–15, August 20–September 12, 1918 (discharge, 50 second-feet).

DIVERSIONS.—A small ditch diverts water from Lake Valley reservoir, which is on a small tributary of North Fork of American River. This water, after passing through Alta power plant, is wasted into the Bear River drainage basin.

STORAGE.—The capacity of Lake Valley reservoir is 8,000 acre-feet. See preceding paragraph.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of North Fork of American River near Colfax, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 7	J. F. Kunesh	2.12	56
May 7	Charles Leidl	5.08	1,570
July 18	....do	2.24	83

Daily discharge, in second-feet, of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	50	373	96	71	306	1,830	1,730	533	122	60	50
2	50	50	156	84	71	338	1,640	1,930	630	122	60	50
3	50	50	101	84	71	356	1,220	1,730	533	122	60	50
4	50	50	96	84	71	338	965	1,830	630	109	60	50
5	50	60	84	71	71	322	895	1,730	680	109	60	50
6	50	91	71	71	1,000	306	930	1,460	580	109	60	50
7	50	71	71	71	860	328	1,070	1,460	605	96	60	50
8	50	60	71	71	430	630	1,070	1,460	556	96	60	50
9	50	60	71	71	322	470	2,150	1,140	533	96	60	50
10	50	60	71	71	280	533	2,270	930	512	96	60	50
11	50	60	60	71	248	1,460	2,040	860	470	96	60	50
12	50	96	60	101	226	2,520	2,040	965	450	91	54	71
13	50	84	60	122	268	1,300	1,460	1,140	450	84	50	180
14	50	67	60	101	274	965	1,300	1,220	410	84	50	930
15	50	60	60	96	258	735	1,220	1,040	338	84	50	186
16	50	60	60	96	226	708	1,140	930	300	84	60	117
17	50	60	71	96	430	630	1,300	930	274	84	60	91
18	50	60	71	101	306	1,000	1,460	860	274	84	60	76
19	50	60	71	150	258	2,520	1,380	860	248	84	60	71
20	50	60	71	109	258	1,640	1,640	828	242	71	54	71
21	50	60	71	96	306	1,300	1,730	860	226	71	50	71
22	50	60	71	96	630	1,140	2,150	860	210	71	50	71
23	50	60	60	96	630	1,000	2,150	860	204	71	50	71
24	50	60	60	96	860	1,040	1,830	860	180	71	50	71
25	50	60	60	96	490	1,640	1,730	795	180	71	50	71
26	50	60	165	76	373	2,390	1,640	708	165	71	50	71
27	50	60	410	84	356	2,270	1,550	580	156	71	50	71
28	50	60	165	71	306	1,640	1,460	533	150	71	50	71
29	50	60	122	71	.....	1,460	1,550	490	144	71	50	91
30	50	60	101	71	.....	1,640	1,640	533	136	71	50	96
31	50	.....	96	71	.....	1,730	.....	680	.....	67	50	.....

Monthly discharge of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	60	50	50.3	3,090
November	96	50	62.3	3,710
December	410	60	103	6,330
January	150	71	88.4	5,440
February	1,000	71	355	19,700
March	2,520	306	1,130	69,500
April	2,270	895	1,550	92,200
May	1,930	490	1,060	65,200
June	630	136	365	21,700
July	122	67	87.1	5,360
August	60	50	55.1	3,390
September	930	50	103	6,130
The year	2,520	50	417	302,000

AMERICAN RIVER AT FAIROAKS, CALIF.

LOCATION.—At highway bridge 1,500 feet northwest of Southern Pacific Co.'s railroad station at Fairoaks Bridge, half a mile southeast of Fairoaks, Sacramento County, and 10 miles below mouth of South Fork.

DRAINAGE AREA.—1,910 square miles.

RECORDS AVAILABLE.—November 3, 1904, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank 800 feet below bridge. A temporary vertical staff gage on right bank 60 feet above bridge was used from October 1 to February 6, February 10 to March 5, and June 19 to September 30. Previous to January 18, 1914, several staff gages at right abutment of bridge were used. From January 18, 1914, to August 24, 1916 and December 9, 1916, to July 21, 1917, the record is from a Gurley printing water-stage recorder at same site as present gage. A temporary gage was used when recorder could not be operated.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year not recorded; minimum stage, 0.3 foot on temporary gage August 12 to September 12 (discharge, 65 second-feet).

1907–1918: Maximum stage recorded, 30.4 feet March 19, 1907 (discharge, from extension of rating curve, about 119,000 second-feet); minimum stage recorded, 2.01 feet from 8 to 10.30 a. m. September 24, 1915 (discharge, from extension of low-water curve, 25 second-feet). Lower stages at various other times have given larger discharges.

DIVERSIONS.—Water is diverted for irrigation above station.

REGULATION.—See descriptions of Middle, North, and South forks. Low-water flow partly regulated by power plant at Folsom.

ACCURACY.—Stage-discharge relation changed February 7, and some time during May. Sand bar interfered with operation of recorder from October 1 to March 4, and June 19 to September 30. The temporary staff gage was read at these times. Rating curves are fairly well defined. Mean daily gage height determined by inspecting the recorder graph or by averaging daily readings. Daily discharge ascertained by applying mean daily gage height to rating table. For periods when recorder was not running (see footnote to daily-discharge table) discharges estimated from flow of the North, South, and Middle forks. Records fair.

Discharge measurements of American River at Fairoaks, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	F. F. Kunesh	[a] 3.57	1,950	June 30	F. F. Kunesh	[a] 1.71	587
Mar. 6	Charles Leidl	[b] 2.62	1,330	July 16	Charles Leidl	a. 82	203
8	do	[b] 4.32	5,070	17	do	[a] 1.10	320
Apr. 1	do	[b] 5.22	7,670	Aug. 2	J. F. Kunesh	a. 62	123
May 3	do	[b] 5.37	8,760				

[a] Gage height read from temporary gage.
[b] Gage height read from gage in recorder well.

Daily discharge, in second-feet, of American River at Fairoaks, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	150	202	202	260	260	2,470	8,120	.....	875	95	65
2	260	150	1,570	290	325	2,470	8,150	.....	680	97	65
3	196	280	1,430	290	260	2,720	6,410	.....	525	95	65
4	150	150	1,220	280	150	2,560	4,730	.....	550	75	65
5	260	202	1,100	325	280	1,530	4,020	.....	475	65	65
6	202	175	910	260	1,100	1,370	3,750	.....	425	75	65
7	150	290	652	325	7,400	2,980	3,920	.....	525	75	65
8	202	150	398	435	6,850	5,570	4,500	.....	450	75	65
9	175	175	290	325	7,170	2,730	5,590	.....	380	75	65
10	202	230	325	290	2,640	2,350	12,400	.....	340	65	65
11	150	150	230	398	2,560	.....	11,800	.....	380	75	65
12	150	202	260	360	2,640	.....	11,000	.....	360	65	65
13	202	125	290	260	2,310	.....	10,200	.....	340	65	320
14	150	202	202	325	1,840	.....	.....	1,790	380	65	3,000
15	150	202	398	325	2,390	.....	.....	1,720	360	65	1,980
16	125	150	150	202	2,390	.....	.....	1,630	324	65	1,330
17	230	125	230	175	1,920	.....	.....	1,490	340	65	1,330
18	175	150	175	398	1,920	.....	.....	1,310	280	65	400
19	150	125	290	325	1,760	.....	.....	1,250	300	65	320
20	230	175	325	202	1,920	.....	.....	1,200	300	65	280
21	202	202	435	175	1,990	.....	.....	1,140	280	65	280
22	66	150	325	202	1,550	.....	.....	1,080	200	65	280
23	175	125	398	360	1,550	.....	.....	1,020	118	65	320
24	260	150	435	325	1,690	.....	.....	964	118	65	320
25	290	325	325	260	1,620	.....	.....	906	118	65	160
26	202	202	515	360	1,480	.....	.....	848	118	65	160
27	230	175	910	150	2,230	.....	.....	790	96	65	280
28	150	175	750	175	2,390	.....	.....	733	95	65	280
29	202	230	700	202	.....	.....	.....	675	95	65	320
30	150	150	260	260	.....	.....	.....	617	75	65	320
31	150	.....	435	325	.....	8,010	.....	.....	95	65	.....

NOTE.—Discharge for periods in which gage was not read obtained as follows: Mar. 11 to 30, estimated as 6,150 second-feet; Apr. 14–30, estimated as 7,500 second-feet; May 1–31, estimated as 5,000 second-feet; June 1–13, estimated as 3,000 second-feet; June 19–29, interpolated; Sept. 14, estimated.

Monthly discharge of American River at Fairoaks, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	290	66	185	11,400
November	325	125	181	10,800
December	1,570	150	520	32,000
January	435	150	284	17,500
February	7,400	150	2,230	124,000
March	.....	.....	5,090	313,000
April	.....	.....	7,400	440,000
May	.....	.....	a5,000	307,000
June	.....	617	1,940	115,000
July	875	75	322	19,800
August	97	65	69.9	4,300
September	3,000	65	415	24,700
The year	.....	65	1,960	1,420,000

a Estimated.

MIDDLE FORK OF AMERICAN RIVER NEAR EAST AUBURN, CALIF.

LOCATION.—In SE. ¼ sec. 6, T. 12 N., R. 9 E., at Mountain Quarry Co.'s plant, about 1½ miles above junction with North Fork of American River and 3½ miles northeast of East Auburn, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1918.

GAGE.—Staff in three sections on left bank at pump house; read by J. A. Collins.

DISCHARGE MEASUREMENTS.—Made from cable 700 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 8 a. m. April 10 (discharge, 6,100 second-feet); minimum stage recorded, 2.4 feet August 25 to September 11 (discharge, 56 second-feet).

1911–1918: Maximum stage recorded, 18.0 feet at 7 a. m. January 1, 1914 (discharge, from extension of rating curve, about 26,400 second-feet); minimum stage recorded, 1.0 foot at 7 a. m. October 23, 24, and 31, 1915 (discharge, 32 second-feet).

DIVERSIONS.—Pilot Creek ditch diverts from Pilot Creek for irrigation on Georgetown divide. Little South Fork ditch diverts from Gerle Creek and discharges into Pilot Creek drainage basin, where it is used when necessary to supplement the flow in Pilot Creek ditch; its maximum discharge is probably less than 20 second-feet.

REGULATION.—Storage is developed in Loon Lake at the head of Gerle Creek to serve the ditches mentioned in the preceding paragraph.

ACCURACY.—Stage-discharge relation changed April 9. Rating curve used October 1 to April 9, well defined below 7,000 second-feet. Curve used April 10 to September 30 fairly well defined below 5,000 second-feet; curves merge into one above 7,800 second-feet; extended above 7,000 second-feet. Gage read to tenths once daily; oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Middle Fork of American River near East Auburn, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 8	J. F. Kunesh	1.67	72
May 17	Charles Leidl	6.28	3,260
July 18	....do	2.68	121

Daily discharge, in second-feet, of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	88	198	286	230	163	492	3,510	4,110	1,600	320	87	56
2	88	142	545	214	155	518	3,120	4,410	b1,750	320	75	56
3	88	142	230	198	155	572	2,200	3,960	1,800	320	75	56
4	88	142	248	168	155	600	2,100	4,410	1,800	a275	75	56
5	82	119	198	168	155	628	2,000	3,960	1,800	230	75	56
6	78	174	198	168	1,270	655	1,520	3,250	1,800	193	75	56
7	78	198	198	168	2,100	1,200	1,700	3,250	b1,650	186	75	56
8	78	142	163	168	905	1,120	2,200	3,250	1,400	176	75	56
9	78	119	142	168	492	775	3,000	3,110	1,600	176	75	56
10	78	119	142	168	545	745	5,050	2,110	1,600	165	75	56
11	78	a130	142	168	545	1,700	4,110	1,900	1,500	158	71	56
12	78	142	130	168	545	5,460	3,810	b2,300	1,900	158	66	71
13	78	168	124	327	545	2,100	3,530	2,720	1,900	142	66	127
14	78	142	119	230	a572	1,440	3,530	2,590	1,800	142	66	1,010
15	78	130	119	230	545	1,200	2,230	2,470	1,400	133	66	750
16	78	119	a138	230	545	1,200	2,000	2,000	1,300	127	66	370
17	78	119	155	230	572	a1,200	2,470	2,000	965	127	66	230
18	78	119	142	214	600	1,200	2,850	2,110	875	127	66	186
19	78	108	142	230	600	4,050	2,720	2,000	790	121	66	158
20	78	98	142	230	518	2,530	2,980	2,110	750	113	66	127
21	78	98	142	224	545	1,900	b3,470	2,230	710	a106	66	127
22	78	98	142	214	1,040	1,700	4,110	2,230	635	99	66	127
23	78	98	142	198	840	1,700	4,570	2,230	600	99	66	127
24	78	98	142	198	1,520	1,610	3,960	2,110	570	99	66	127
25	78	98	a170	198	808	2,100	3,960	2,110	450	99	56	127
26	78	98	198	198	545	3,250	4,110	1,800	420	99	56	127
27	78	98	808	198	545	4,050	3,530	1,600	420	99	56	121
28	78	98	572	192	492	2,760	3,530	1,400	395	87	56	113
29	78	a98	306	174	.....	2,420	3,530	1,300	370	87	56	133
30	94	98	348	168	.....	2,310	3,810	1,200	345	87	56	158
31	204	.....	348	168	.....	3,510	.....	1,600	.....	87	56	.....

a No gage-height record; discharge interpolated.
b No gage-height record, discharge estimated from flow of North and South forks of American River.

Monthly discharge of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	204	78	84.0	5,160
November	198	98	125	7,440
December	808	119	226	13,900
January	327	168	200	12,300
February	2,100	155	643	35,700
March	5,460	492	1,830	113,000
April	5,050	1,520	3,170	189,000
May	4,410	1,200	2,510	154,000
June	1,900	345	1,160	69,000
July	320	87	153	9,410
August	87	56	67.2	4,130
September	1,010	56	164	9,760
The year	5,460	56	860	623,000

SOUTH FORK OF AMERICAN RIVER NEAR PLACERVILLE, CALIF.

LOCATION.—In SE. ¼ sec. 26, T. 11 N., R. 10 E., below bridge at Chili Bar, on Placerville-Georgetown road, about 1,000 feet below Big Canyon Creek and 3 miles northwest of Placerville, Eldorado County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 11, 1911, to September 30, 1918.

GAGE.—Staff in 2 sections bolted to solid rock on right bank about 1,000 feet below bridge; high-water section painted on the rocks above second section. Gage read by John Hutter and Anna Schmook.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.3 feet at 9 a. m. March 12 (discharge, 5,430 second-feet); minimum stage recorded, 3.31 feet at 7.45 a. m. August 27 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 19.0 feet at 4 p. m. January 25, 1914 (discharge, form extension of rating curve, about 15,000 second-feet); minimum stage recorded, 3.31 feet at 7.45 a. m. August 27, 1918 (discharge, 50 second-feet).

DIVERSIONS.—Just below the mouth of Silver Fork, water is diverted for irrigation, mining, and the municipal supply for Placerville. Power is developed near the mouth of Rock Creek by the Western States Gas & Electric Co. At low water the entire flow of the South Fork of American River is diverted for power; occasionally the quantity is insufficient and additional water is purchased from the Sierra Water Supply Co. The water diverted for power is returned to the river above the gaging station.

REGULATION.—Echo and Silver lakes are used as storage reservoirs.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 5,000 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

The following discharge measurement was made by J. F. Kunesh:

October 10, 1917: Gage height, 3.72 feet; discharge, 101 second-feet.

Daily discharge, in second-feet, of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	118	72	170	154	103	341	2,200	3,640	2,040	295	86	51
2	115	79	377	146	115	359	2,370	3,640	2,200	268	85	54
3	118	86	214	143	124	377	1,880	3,640	2,200	257	85	59
4	112	78	170	133	110	415	1,590	4,550	2,370	257	80	54
5	108	72	146	130	115	455	1,520	4,040	2,370	235	76	53
6	115	130	143	128	280	377	1,450	3,450	2,370	214	72	51
7	127	130	130	130	1,590	1,080	1,590	3,450	2,370	195	67	54
8	108	115	127	133	500	1,020	1,730	3,540	2,370	178	65	60
9	124	103	115	146	377	745	2,040	2,550	2,370	162	62	64
10	103	86	115	154	359	590	3,360	2,040	2,200	154	58	67
11	92	100	115	124	280	1,590	3,090	1,880	2,040	146	60	68
12	124	127	109	115	257	5,430	2,910	2,460	2,040	144	61	64
13	94	127	108	195	415	2,120	2,820	2,910	2,040	133	54	138
14	130	112	106	162	590	1,450	2,200	3,270	2,370	128	51	800
15	89	106	103	162	415	1,020	1,960	2,460	1,800	112	51	690
16	83	103	110	162	246	1,080	2,040	2,040	1,450	103	64	341
17	92	100	115	154	640	1,020	2,200	2,280	1,320	96	68	195
18	118	100	130	143	396	1,080	2,640	2,200	1,200	87	71	162
19	86	94	143	146	257	3,270	2,550	2,370	1,020	89	67	140
20	78	93	138	162	280	2,040	2,910	2,640	965	92	65	127
21	78	93	136	162	377	1,590	3,270	2,550	855	89	66	122
22	79	92	133	130	1,200	1,450	3,740	2,370	745	86	64	127
23	106	92	127	122	665	1,380	3,940	2,550	665	100	60	127
24	112	89	115	121	1,450	1,320	3,740	2,460	640	103	59	146
25	112	93	115	127	690	1,450	3,540	2,280	568	102	53	130
26	97	92	143	121	500	1,660	3,450	1,960	500	100	52	138
27	75	93	224	115	435	2,730	3,090	1,590	455	97	50	130
28	72	94	280	109	377	2,040	3,000	1,380	415	90	56	112
29	75	96	214	127	.....	1,800	3,360	1,320	359	89	53	136
30	70	94	178	130	.....	1,880	3,270	1,450	310	86	51	136
31	70	.....	162	114	.....	2,120	.....	1,880	.....	86	51	.....

Monthly discharge of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	130	70	99.4	6,110
November	130	72	98.0	5,830
December	377	103	152	9,350
January	195	109	139	8,550
February	1,590	103	469	26,000
March	5,430	341	1,460	89,800
April	3,940	1,450	2,650	158,000
May	4,550	1,320	2,610	160,000
June	2,370	310	1,490	88,700
July	295	86	141	8,670
August	86	50	63.3	3,890
September	800	51	153	9,100
The year	5,430	50	793	574,000

CACHE CREEK BASIN.

CLEAR LAKE AT LAKEPORT, CALIF.

LOCATION.—At municipal wharf on north side of Third Street at Lakeport, Lake County.

RECORDS AVAILABLE.—February 25, 1913, to September 30, 1918.

GAGE.—Vertical staff fastened to piling at municipal wharf; read once a day by C. J. Borghi.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3.03 feet April 10–14; minimum stage recorded, —1.70 feet September 29.

1913–1918: Maximum stage recorded, 11.12 feet January 28, 1914; minimum stage recorded, —1.70 feet September 29, 1918.

COOPERATION.—Gage-height record furnished by Yolo Water & Power Co.

Daily gage height, in feet, of Clear Lake at Lakeport, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.13	0.73	0.62	0.80	0.88	1.88	2.93	2.90	1.98	1.10	—0.07	—1.17
2	1.10	.73	.65	.80	.90	1.85	2.92	2.88	1.96	1.07	— .10	—1.20
3	1.08	.72	.67	.78	.90	1.85	2.92	2.82	1.94	1.02	— .15	—1.24
4	1.08	.72	.70	.78	.90	1.87	2.93	2.75	1.90	1.00	— .18	—1.27
5	1.08	.70	.67	.78	.90	1.87	2.93	2.73	1.88	.98	— .21	—1.30
6	1.05	.70	.65	.80	1.02	1.88	2.77	2.74	1.86	.96	— .25	—1.30
7	1.03	.70	.65	.80	1.10	1.92	2.97	2.74	1.83	.91	— .30	—1.33
8	1.00	.70	.65	.78	1.10	1.92	2.97	2.70	1.80	.87	— .33	—1.35
9	1.00	.70	.65	.80	1.12	1.92	3.02	2.67	1.78	.83	— .36	—1.39
10	1.00	.70	.63	.80	1.15	1.95	3.03	2.63	1.75	.78	— .39	—1.43
11	1.00	.70	.63	.80	1.17	.....	3.03	2.58	1.72	.75	— .44	—1.47
12	.98	.71	.63	.80	1.15	2.08	3.03	2.60	1.69	.70	— .48	—1.50
13	.96	.71	.65	.82	1.12	2.12	3.03	2.45	1.64	.68	— .53	—1.40
14	.94	.71	.62	.85	1.15	2.18	3.03	2.48	1.60	.65	— .58	—1.38
15	.92	.70	.62	.88	1.17	2.22	3.00	2.48	1.58	.60	— .62	—1.33
16	.90	.70	.61	.88	1.18	2.22	3.02	2.45	1.55	.58	— .66	—1.40
17	.89	.68	.63	.90	1.30	2.25	3.02	2.40	1.52	.50	— .70	—1.43
18	.88	.67	.65	.90	1.38	2.32	3.01	2.37	1.45	.48	— .74	—1.45
19	.88	.67	.64	.90	1.35	2.38	2.97	2.35	1.41	.42	— .77	—1.48
20	.85	.67	.64	.90	1.45	2.46	3.00	2.30	1.40	.38	— .80	—1.50
21	.82	.67	.65	.90	1.50	2.50	3.00	2.30	1.39	.33	— .83	—1.52
22	.80	.67	.65	.88	1.55	2.55	3.00	2.27	1.35	.28	— .87	—1.56
23	.78	.64	.65	.88	1.65	2.60	3.00	2.25	1.33	.25	— .90	—1.60
24	.78	.62	.65	.88	1.75	2.67	2.97	2.20	1.30	.23	— .93	—1.62
25	.77	.62	.70	.88	1.78	2.70	2.95	2.18	1.28	.20	— .95	—1.63
26	.77	.62	.75	.88	1.80	2.78	2.95	2.20	1.24	.17	— .97	—1.65
27	.77	.62	.80	.88	1.88	2.82	2.95	2.13	1.20	.12	—1.00	—1.67
28	.76	.62	.80	.88	1.88	2.88	2.95	2.10	1.17	.08	—1.07	—1.68
29	.75	.62	.78	.88	.....	2.92	2.90	2.05	1.15	.05	—1.09	—1.70
30	.75	.62	.80	.88	.....	2.92	2.90	2.05	1.12	.00	—1.10	.....
31	.73	.....	.80	.88	.....	2.93	.....	2.02	.....	— .03	—1.13	.....

CACHE CREEK AT YOLO, CALIF.

LOCATION.—A highway bridge half a mile south of Yolo, Yolo County, in Río Jesús María grant, 1,000 feet above Southern Pacific Co.'s railroad bridge.

DRAINAGE AREA.—1,320 square miles.

RECORDS AVAILABLE.—January 1, 1903, to September 30, 1918.

GAGE.—Staff in four sections; lower section vertical, fastened to pile under bridge near left bank; second section, inclined, right bank, 30 feet above bridge; third section, vertical, fastened to cottonwood tree on right bank 70 feet above bridge; upper section, vertical, fastened to upper end of right abutment. This gage was installed October 2, 1904, at the same datum as original gage on upstream side of right pier of bridge. Gage read by Mrs. Cornelia W. Bigelow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, 3.9 feet at 8 a. m. February 24 (discharge, 1,170 second-feet); no flow April 23 to May 9 and May 31 to Sept. 12. 1903–1918: Maximum stage recorded, 27.8 feet at 5 p. m. February 2, 1915 (discharge, 21,100 second-feet); no flow for periods in nearly every year.

DIVERSIONS.—Numerous ditches divert water for irrigation above the station.

REGULATION.—At low water channel is sometimes deepened at Lower Lake in order to increase the flow from lake.

ACCURACY.—Stage-discharge relation changed February 24 and March 19. Rating curve used up to February 24 well defined; that used from February 25 to March 19, poorly defined; that used from March 19 to September 30, fairly well-defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent up to February 24, poor from February 25 to March 19, and fair from March 19 to September 30.

Discharge measurements of Cache Creek at Yolo, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 8	0.69	19
May 2		0

Daily discharge, in second-feet, of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Sept.
1	9	28	20	16	16	110	148	.....	.....
2	22	28	20	20	16	83	105	.....	.....
3	23	27	20	20	16	63	85	.....	.....
4	20	31	20	20	16	34	73	.....	.....
5	27	31	20	20	14	28	65	.....	.....
6	27	31	20	20	14	21	58	.....	.....
7	27	27	20	20	153	17	51	.....	.....
8	22	27	23	20	270	27	45	.....	.....
9	14	27	23	20	162	27	45	.....	.....
10	4.6	25	23	23	105	39	45	12	.....
11	12	22	20	23	73	78	39	5.5	.....
12	23	12	20	20	46	443	34	2.5	.....
13	23	11	20	16	36	348	30	2.5	32
14	17	7	20	16	29	249	30	1.4	68
15	20	5.5	20	16	16	174	26	.3	41
16	7	5.5	20	16	12	117	26	.1	30
17	8	5.5	20	16	15	105	21	.1	30
18	31	16	23	16	210	90	15	.1	26
19	31	16	23	16	198	920	9.5	.1	9.5
20	14	23	23	16	204	620	7.5	.1	9.5
21	4	20	23	16	220	406	6.5	.1	9.5
22	4	20	23	16	451	288	.7	.3	12
23	4	20	20	16	522	230	.....	.3	15
24	4	23	20	16	995	204	.....	.3	11
25	4	22	20	16	620	190	.....	.3	9.5
26	9	16	20	16	348	345	.....	.3	15
27	7	16	20	22	239	345	.....	.3	15
28	4	16	20	23	174	270	.....	2.5	15
29	20	20	16	20	.....	236	.....	2.5	15
30	20	20	16	16	.....	220	.....	2.1	15
31	20	.....	16	16	.....	198	.....	.0	.....

NOTE.—No flow Apr. 23 to May 9 and May 31 to Sept. 12.

Monthly discharge of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	31	4	15.5	953
November	31	5.5	19.6	1,170
December	23	16	20.4	1,250
January	23	16	18.2	1,120
February	995	12	185	10,300
March	920	17	210	12,900
April	148	0	32.2	1,920
May	12	0	1.09	67
September	68	0	12.6	750
The year	995	0	42.1	30,400

PUTAH CREEK BASIN.

PUTAH CREEK AT WINTERS, CALIF.

LOCATION.—Just below Southern Pacific Co.'s railroad bridge at Winters, Yolo County, in Rio de los Putos grant.

DRAINAGE AREA.—805 square miles.

RECORDS AVAILABLE.—September 26, 1905, to September 30, 1918.

GAGE.—Staff in five sections on left bank, 600 feet below bridge; read by Miss Velma Wyatt. An auxiliary vertical staff on right bank is used for low water. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Two channels at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.8 feet at 11 a. m. March 19 (discharge, 3,790 second-feet); no flow July 7 to September 30.

1905–1918: Maximum stage recorded, 39.0 feet December 31, 1913, from flood marks at gage (discharge, from extension of rating curve, about 60,000 second-feet); no flow during part of the years ending September 30, 1913, 1914, and 1918.

DIVERSIONS.—There are several small diversions for irrigation above the station.

REGULATION.—None.

ACCURACY.—S tage-discharge relation changed February 23. Curves are well defined below 200 second-feet and extended above. Gage read to hundredths once daily and occasionally twice daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Putah Creek at Winters, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 9	5.01	154
May 2	4.41	53
July 16	.....	0

Daily discharge, in second-feet, of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	1.4	2.2	3.0	26	13	300	340	58	8	0.9
2	1.4	3.0	5.5	22	13	265	265	52	8	.7
3	1.2	3.7	3.7	18	12	232	235	46	6.5	.5
4	1.2	3.9	3.2	18	12	201	235	41	6.0	.5
5	.9	4.2	3.0	18	13	179	216	41	5.5	.7
6	.8	1.5	3.0	15	22	173	201	40	4.6	.2
7	.8	2.7	3.7	15	1,930	170	187	36	3.5	.....
8	.8	2.2	4.2	15	728	160	187	34	3.5	.....
9	.8	4.2	4.6	12	460	148	187	36	4.6	.....
10	1.2	3.0	4.8	12	186	144	195	32	2.4	.....
11	1.2	4.6	4.8	12	153	402	179	32	1.8	.....
12	.8	4.6	4.8	15	125	1,190	160	32	1.5	.....
13	1.0	1.8	5.0	14	104	1,190	138	32	1.3	.....
14	1.0	3.0	5.5	16	98	700	128	28	1.3	.....
15	1.6	3.9	5.5	24	89	475	119	28	2.2	.....
16	2.2	1.8	5.5	26	81	320	110	24	2.4	.....
17	2.2	3.0	5.5	39	1,770	300	110	17	2.4	.....
18	1.5	3.7	6.0	35	1,130	340	98	20	1.3	.....
19	1.5	1.6	6.0	30	570	3,190	93	20	1.3	.....
20	1.5	1.6	5.5	26	570	1,190	93	18	1.3	.....
21	1.5	4.2	5.5	22	1,050	825	86	16	1.3	.....
22	2.0	4.2	5.5	21	1,530	640	78	14	1.3	.....
23	2.6	4.2	6.0	18	2,470	580	78	14	1.3	.....
24	2.6	4.2	5.5	18	2,500	525	77	14	1.3	.....
25	1.9	4.2	7.5	18	1,190	760	71	12	1.3	.....
26	1.4	4.4	12	18	825	1,350	71	14	1.3	.....
27	1.5	2.4	10	15	640	1,190	67	12	.9	.....
28	1.5	4.4	320	14	475	760	64	11	.9	.....
29	1.0	2.7	98	14	.....	640	62	9.5	.9	.....
30	1.5	4.4	81	13	.....	525	58	9	.9	.....
31	1.5	.....	36	13	.....	432	.....	8	.....	.....

not read Oct. 15, 22, and 25; discharge interpolated. Creek dry July 7 to Sept. 30.

Monthly discharge of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.6	0.8	1.42	87.3
November	4.6	1.5	3.32	198
December	320	3.0	21.9	1,350
January	39	12	19.1	1,170
February	2,500	12	670	37,200
March	3,190	144	629	38,700
April	340	58	140	8,330
May	58	8	25.8	1,590
June	8	.9	2.69	160
July	.9	.0	.11	6.8
The year	3,190	.0	123	88,800

EEL RIVER BASIN.

EEL RIVER AT SCOTIA, CALIF.

LOCATION.—In sec. 18, T. 1 N., R. 1 E., at Wildwood Bridge, about half a mile northeast of Scotia, Humboldt County. Laribee Creek enters 14 miles above and Van Duzen River 7 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 15, 1910, to February 6, 1915; October 1, 1916, to September 30, 1918.

GAGE.—Staff gage in eight sections, read by James C. Bixler. Section No. 1 is spiked to old cofferdam on northeast corner of footing of middle pier; No. 2 is painted on upstream and south corner of middle pier; No. 3 is painted on downstream and north face of footing of south pier; No. 4 is painted on vertical form brace at downstream end of south pier; No. 5 is painted on downstream face of south pier; No. 6 is painted on vertical post of first wooden bent of trestle; No. 7 painted on vertical post of second bent of trestle; No. 8 painted on vertical post of third bent of trestle. Former gages at this station were destroyed when suspension bridge was built in 1914 and when it was destroyed in 1915. The original datum has not been maintained but the new datum probably does not differ more than a few tenths of a foot from the original.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 27.7 feet at 12.30 a. m. February 7 (discharge, 78,600 second-feet); minimum stage recorded, 9.4 feet August 23 to September 7 and September 10 to 12 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 55.5 feet February 2, 1915 (discharge, from extension of rating curve, about 290,000 second-feet); minimum stage recorded, 9.4 feet August 23 to September 7 and September 10 to 12, 1918 (discharge, 50 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined below 120,000 second-feet extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by J. F. Kunesh:

August 28, 1918: Gage height, 9.43 feet; discharge, 56 second-feet.

Daily discharge, in second-feet, of Eel River at Scotia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	70	11,700	2,340	1,040	6,030	9,510	2,030	680	150	80	50
2	100	70	8,070	1,840	1,150	5,400	8,430	1,940	630	141	74	50
3	90	90	4,790	1,490	1,330	4,790	7,020	1,840	600	135	70	50
4	90	130	1,940	1,180	2,230	5,090	6,030	1,750	580	122	70	50
5	90	173	1,330	1,110	4,790	4,790	5,400	1,660	535	110	70	50
6	90	245	1,110	1,110	37,500	3,940	4,790	1,660	535	106	66	50
7	90	255	886	1,150	53,600	3,670	4,220	1,660	490	100	60	50
8	90	230	735	1,180	22,600	3,670	4,220	1,490	472	100	60	52
9	90	197	660	1,180	14,600	3,670	18,500	1,490	445	100	60	52
10	90	197	600	1,150	8,790	3,670	20,100	1,330	445	110	60	50
11	90	255	562	1,110	6,680	5,090	13,100	1,330	400	110	60	50
12	90	472	535	1,150	5,400	16,500	9,510	1,180	400	110	60	50
13	90	850	535	2,680	6,030	20,100	8,430	1,150	360	100	60	62
14	90	680	508	4,790	12,400	14,200	7,370	1,110	360	100	60	120
15	80	600	490	6,680	11,000	11,000	6,030	1,070	360	100	60	115
16	80	580	445	4,790	11,300	8,790	5,400	1,040	320	100	60	110
17	80	562	445	3,670	31,500	8,430	5,090	1,040	320	100	60	120
18	80	472	445	3,670	24,300	14,600	4,500	975	320	100	60	115
19	80	336	630	4,790	14,600	27,000	4,220	975	307	100	60	104
20	80	288	814	3,940	10,600	18,500	3,670	910	288	100	60	100
21	80	268	735	3,160	8,070	12,800	3,670	886	288	100	60	118
22	80	245	680	2,560	6,680	11,700	3,410	850	268	100	50	112
23	80	205	630	2,230	6,030	10,200	3,160	850	255	100	50	106
24	80	197	580	2,030	12,800	9,510	2,920	850	230	94	50	102
25	80	185	580	1,840	12,400	21,800	2,920	790	215	90	50	98
26	80	185	6,350	1,660	9,150	24,300	2,680	790	205	90	50	96
27	80	197	18,100	1,490	7,720	18,500	2,680	790	185	90	50	90
28	74	205	11,000	1,330	6,680	14,200	2,560	735	185	90	50	90
29	70	215	6,350	1,180	.....	11,700	2,450	735	165	86	50	86
30	70	4,220	3,670	1,110	.....	10,200	2,230	735	165	80	50	82
31	70	.....	2,920	1,070	.....	9,510	.....	680	.....	80	50	.....

Monthly discharge of Eel River at Scotia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	100	70	84.0	5,160
November	4,220	70	429	25,500
December	18,100	445	2,870	176,000
January	6,680	1,070	2,280	140,000
February	53,600	1,040	12,500	694,000
March	27,000	3,670	11,100	683,000
April	20,100	2,230	6,140	365,000
May	2,030	680	1,170	71,900
June	680	165	367	21,900
July	150	80	103	6,330
August	80	50	59.0	3,630
September	120	50	81.0	4,820
The year	53,600	50	3,040	2,200,000

MIDDLE EEL RIVER NEAR COVELO, CALIF.

LOCATION.—In E. ½ sec. 36, T. 23 N., R. 12 W., near Covelo ranger station, and 6 miles east of Covelo, Mendocino County. Williams Creek enters half a mile above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 22, 1911, to September 30, 1918.

GAGE.—Staff in two sections on left bank, about one-fourth mile west of ranger station and 1 mile below bridge; read by C. V. Brereton. Several changes in sections have been made but original location and datum have been maintained.

DISCHARGE MEASUREMENTS.—Made from cable installed December 8, 1913, 300 feet above gage.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet February 6 (discharge, from extension of rating curve, about 10,000 second-feet); minimum stage, unknown; incomplete record.

1911–1918: Maximum stage recorded, between 30 and 31 feet at 4.30 p. m. December 31, 1913 (discharge, between 41,500 and 47,100 second-feet). Water overtopped gage and washed out high-water section. Minimum stage recorded, 6.9 feet at 8 a. m. September 12, 1915 (discharge, 2.5 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 8,000 second-feet and is extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage-height to rating table. Records good except for extreme high water which are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:
August 26, 1918: Gage height, 7.02 feet; discharge, 3.6 second-feet.

Daily discharge, in second-feet, of Middle Eel River, near Covelo, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	9.5	9.5	1,680	235	155	630	2,100
2	9.5	9.5	422	206	155	630	1,910
3	9.5	9.5	422	179	134	753	1,730
4	9.5	12	337	179	115	885	1,550
5	9.5	12	266	179	573	954	1,360
6	9.5	15	206	179	8,090	818	1,190
7	9.5	15	155	179	2,070	754	2,910
8	9.5	12	155	179	1,260	690	4,640
9	9.5	12	115	179	1,020	519	4,490
10	9.5	22	85	179	885	519	2,730
11	9.5	22	85	179	630	954	2,480
12	9.5	155	63	206	630	1,590	2,240
13	9.5	99	54	337	690	1,180	2,000
14	9.5	54	54	422	630	1,180	1,750
15	9.5	40	54	300	573	1,180	1,510
16	9.5	40	54	378	818	1,180	1,260
17	9.5	35	54	469	1,340	1,340	1,020
18	9.5	35	54	1,260	630	2,610	1,020
19	9.5	35	54	1,180	519	2,070	998
20	9.5	35	54	1,100	519	1,590	976
21	9.5	35	54	954	519	1,310	954
22	9.5	35	54	885	469	2,070	927
23	9.5	30	54	753	573	3,090	900
24	9.5	30	54	630	573	5,960	872
25	9.5	26	54	469	469	6,300	845
26	9.5	26	2,610	422	573	2,970	818
27	9.5	22	1,260	378	630	2,850	.....
28	9.5	22	235	337	630	2,850	.....
29	9.5	26	155	266	.....	2,730	.....
30	9.5	722	155	206	.....	2,610	.....
31	9.5	.....	73	134	.....	2,280	.....

NOTE.—No record Mar. 8, Apr. 1–5, 7, 11–16, 19–20, and 22–25; discharge estimated from flow of Eel River at Scotia. No gage-height record Apr. 27 to Sept. 30.

Monthly discharge of Middle Eel River near Covelo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9.5	9.5	9.50	584
November	722	9.5	55.1	3,280
December	2,610	54	296	18,200
January	1,260	134	424	26,100
February	8,090	115	924	51,300
March	6,300	519	1,840	113,000
April 1 to 26	4,640	818	1,740	89,700
The period				302,000

KLAMATH RIVER BASIN.

WILLIAMSON RIVER NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 14, T. 30 S., R. 10 E., at Beckley ranch, 1 mile east of road from Klamath Falls to Silver Lake, about 42 miles from Silver Lake. Station is in Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25, 1917, to September 30, 1918.

GAGE.—Vertical staff on south abutment of wagon bridge. Gage readers, Earl Powers and Mrs. James Beckley.

DISCHARGE MEASUREMENTS.—Made from foot log about 200 feet above gage; current sluggish; conditions fair.

CHANNEL AND CONTROL.—Stream bed of firm sand and clay, covered during summer with growths of aquatic plants; no defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 1.10 feet October 13, 14, November 30 and December 1 (no discharge computed). Maximum discharge 88 second-feet, March 19 (gage height 1.00 foot); minimum discharge recorded during year 50 second-feet, June 30 (gage height 0.68 foot).

ICE.—Stream freezes during winter; records suspended.

DIVERSIONS.—A few hundred acres are irrigated from Williamson River and tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unstable owing to growth of aquatic plants. Daily discharge ascertained by shifting-control method. Gage read once a day to hundredths. Records fair.

Discharge measurements of Williamson River near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	R. C. Briggs	0.67	67	June 6	R. C. Briggs	0.83	63
30	Briggs and Henshaw	.67	62	July 30	do	.87	56
May 8	R. C. Briggs	.77	64				

Daily discharge, in second-feet, of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	69	69	62	61	51	54	52
2	69	69	64	60	52	54	52
3	69	69	64	60	51	54	52
4	66	69	64	62	52	54	52
5	66	69	63	62	52	54	54
6	66	66	64	63	52	52	56
7	69	66	64	62	52	52	56
8	69	66	64	61	52	52	56
9	69	66	67	59	59	52	56
10	69	66	66	60	64	54	56
11	69	66	66	59	59	54	59
12	69	66	66	58	56	52	59
13	69	66	66	58	56	52	59
14	69	66	68	57	56	54	59
15	72	66	70	56	54	54	59
16	72	66	67	56	54	54	59
17	75	64	65	55	56	54	59
18	81	62	64	54	59	54	59
19	88	62	64	54	56	52	59
20	84	62	64	54	56	52	59
21	84	62	63	55	56	54	59
22	84	62	63	57	56	54	59
23	78	62	64	59	56	54	56
24	78	64	64	56	56	54	59
25	75	62	64	55	56	54	59
26	75	62	65	54	56	54	62
27	75	62	64	54	54	52	62
28	75	62	63	54	54	52	62
29	72	62	63	52	56	52	62
30	72	62	62	50	54	52	62
31	69	.....	62	.....	54	52	.....

NOTE.—Discharge Oct. 1 to Dec. 3 not computed; gage not read Dec. 4 to Feb. 28.

Monthly discharge of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	88	66	73.1	4,490
April	69	62	64.8	3,860
May	70	62	64.5	3,970
June	63	50	57.2	3,400
July	64	51	55.1	3,390
August	54	52	53.2	3,270
September	62	52	57.8	3,440
The period	.....	.....	.....	25,800

WILLIAMSON RIVER ABOVE SPRING CREEK, NEAR KLAMATH AGENCY, OREG.

LOCATION.—In sec. 2, T. 34 S., R. 7 E., 8 miles north of Chiloquin, about 2 miles above Spring Creek, and 6 miles northeast of Klamath Agency, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 9, 1917, to September 30, 1918; stations maintained at Rocky Ford in sec. 1, T. 33 S., R. 7 E., March 26, 1908, to June 30, 1910; and 5 miles above Spring Creek, May 1, 1912, to September 30, 1913. Inflow between Rocky Ford and present station about 20 second-feet, mostly from springs.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by Henry Shadley and R. C. Briggs.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet below gage, or by wading at same section.

CHANNEL AND CONTROL.—One channel at all stages, straight with fairly smooth bottom and even current. Rocky riffle about 200 feet below gage practically permanent, except possibly as affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 1.88 feet, at 12 m., March 29 and 10 a. m. March 30 (discharge, 475 second-feet); minimum stage recorded 0.09 foot July 31 (discharge, 30 second-feet).

Maximum discharge for 1917, determined in 1918 by leveling to high-water mark, was about 5.7 feet; discharge can not be computed.

ICE.—Some ice may form in extremely cold weather. No records during cold weather of 1918.

DIVERSIONS.—A large area of Klamath marsh and adjoining lands are irrigated by natural flooding, and smaller areas by ditches.

REGULATION.—None.

ACCURACY.—Stage discharge relation changed during a gap in record, between December and March. Rating curve for November and December fairly well defined; for March to August, well defined. Operation of recorder satisfactory except during July and August; float probably resting on floor of gage well during parts of these months. Daily discharge ascertained by applying to rating table the mean daily gage heights obtained by inspecting the recorder graph. Records good except those for July and August, which are fair.

Discharge measurements of Williamson River above Spring Creek, near Klamath Agency, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 14	0.55	84	June 5	0.34	58
Mar. 19	1.49	353	21	.18	42.4
Apr. 6	1.71	419	July 31	.09	29.4
23	1.05	228			

Daily discharge, in second-feet, of Williamson River above Spring Creek, near Klamath Agency, Oreg., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	162	.....	445	142	71	41	30
2	.....	178	.....	445	135	69	41	31
3	.....	190	.....	445	125	66	40	31
4	.....	190	.....	445	115	63	40	31
5	.....	190	.....	415	110	62	40	31
6	.....	205	.....	415	110	58	40	31
7	.....	205	.....	415	112	57	38	31
8	.....	205	.....	400	103	57	38	32
9	84	205	.....	385	106	56	38	32
10	86	205	.....	370	110	53	36	31
11	88	205	.....	370	108	53	36	32
12	88	205	.....	355	106	52	36	32
13	90	205	.....	340	101	49	35	32
14	92	190	.....	325	99	48	35	33
15	94	190	.....	325	101	47	34	33
16	94	190	.....	310	103	44	34	.....
17	94	190	.....	310	106	42	33	.....
18	94	190	.....	295	101	41	34	.....
19	99	190	355	295	97	41	34	.....
20	101	205	355	280	95	40	34	.....
21	101	220	370	250	97	40	34	.....
22	103	220	385	235	95	42	34	.....
23	106	235	400	222	90	42	34	.....
24	106	250	430	222	88	43	34	.....
25	106	265	445	200	88	43	34	.....
26	103	265	460	195	88	42	33	.....
27	103	.....	460	182	86	42	33	.....
28	106	.....	460	172	86	42	32	.....
29	115	.....	460	160	84	41	31	.....
30	128	.....	460	155	78	41	30	.....
31	.....	.....	460	.....	75	.....	30	.....

NOTE.—Mean discharge estimated as follows: Nov. 1-8, 80 second-feet; Dec. 27-31, 280 second-feet; Jan. 1-10, 270 second-feet; Jan. 11-31, 250 second-feet; Mar. 1-15, 280 second-feet; Mar. 16-18, 300 second-feet; Aug. 16-31, 40 second-feet.

Monthly discharge of Williamson River above Spring Creek, near Klamath Agency, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	[a] 70.0	4,300
November	128	.....	94.0	5,590
December	.....	162	218	13,400
January	.....	.....	[a] 256	15,700
February	.....	.....	[a] 270	15,000
March	460	.....	342	21,000
April	445	155	313	18,600
May	142	75	101	6,210
June	71	40	49.6	2,950
July	41	30	35.4	2,180
August	.....	30	35.9	1,990
September	.....	.....	[a] 60.0	3,570
The year	460	30	153	110,000

[a] Estimated.

WILLIAMSON RIVER BELOW SPRAGUE RIVER, NEAR CHILOQUIN, OREG.

LOCATION.—In sec. 3, T. 35 S., R. 7 E., one-fourth mile below mouth of Sprague River and three-fourths mile southwest of Chiloquin, Klamath County.

DRAINAGE AREA.—2,810 square miles.

RECORDS AVAILABLE.—June 25, 1917, to September 30, 1918. The sum of discharge records at stations on Williamson and Sprague rivers above their junction is directly comparable with these records.

GAGE.—Friez water-stage recorder on left bank; inspected by F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made at gage section from cable erected in November, 1917.

CHANNEL AND CONTROL.—Rocky ledge and boulders; probably permanent. Current somewhat uneven.

EXTREME OF DISCHARGE.—Maximum open-channel stage during year from water-stage recorder 2.38 feet at 12 m. March 28 (discharge, 2,000 second-feet); minimum stage from water-stage recorder, 0.84 feet July 14–17 (discharge, 582 second-feet; total, including canal, 616 second-feet).

1911–1917: Maximum discharge, obtained by adding results obtained at stations above junction, about 7,000 second-feet April 27, 1917; Williamson River estimated as 2,500 second-feet. Minimum combined discharge, 568 second-feet August 31 and September 1, 1915.

ICE.—Never any effect from ice here.

DIVERSIONS.—Modoc Point canal diverts water past station. Records furnished by United States Indian Service, at flume No. 1, below wasteway and about a mile below intake, have been used to compute total run-off past station. Large areas of land are irrigated from the river and its tributaries.

ACCURACY.—Stage-discharge relation practically permanent; rating curve well defined. Operation of recorder satisfactory October 20 to November 24, and after February 9; records for December somewhat uncertain. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records excellent, except October, December, and January, which are only fair on account of fragmentary or imperfect gage-height record, and May fair on account of log obstruction.

COOPERATION.—Station installed and part of field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Williamson River below Sprague River near Chiloquin, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. C. Briggs	1.10	768	May 18	H. W. Humphrey	1.28	908
Mar. 20	do	1.49	1,250	June 6	do	1.00	760
Apr. 4	Humphrey[a] and Briggs.	1.90	1,490	20	R. C. Briggs	.92	636
24	R. C. Briggs	1.59	1,150	Aug. 1	do	.94	686

[a] Engineer employed by U. S. Reclamation Service.

Daily discharge, in second-feet, of Williamson River below Sprague River near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	790	960	.....	1,100	1,600	1,160	750	614	654	.....
2	.....	790	960	.....	1,100	1,550	1,120	750	606	646	.....
3	.....	830	1,000	.....	1,100	1,500	.....	750	598	630	.....
4	.....	830	1,050	.....	1,100	1,500	.....	750	590	630	.....
5	.....	830	1,000	.....	1,140	1,500	.....	710	590	630	.....
6	.....	830	960	.....	1,140	1,460	.....	710	590	630	.....
7	.....	830	960	.....	1,180	1,410	.....	710	590	622	670
8	.....	830	960	.....	1,140	1,360	.....	694	590	622	694
9	.....	830	1,000	1,180	1,140	1,320	.....	694	590	622	694
10	.....	830	960	1,230	.....	1,320	.....	686	590	622	686
11	.....	830	1,000	1,280	.....	1,320	960	686	590	622	694
12	.....	830	1,000	1,240	.....	1,360	960	686	598	622	702
13	.....	830	1,000	1,210	.....	1,410	960	678	590	622	710
14	.....	830	1,000	1,180	.....	1,460	950	670	582	630	702
15	.....	830	1,050	1,140	.....	1,460	940	662	582	630	694
16	.....	830	1,050	1,140	1,180	1,460	930	662	582	630	702
17	.....	830	1,050	1,100	1,180	1,460	915	654	582	630	702
18	.....	830	1,050	1,100	1,230	1,410	915	654	590	630	710
19	.....	830	1,100	1,100	1,230	1,360	915	646	590	630	702
20	790	830	1,100	1,050	1,320	1,320	915	646	590	630	694
21	790	830	1,100	1,050	1,410	1,280	915	646	590	630	694
22	790	830	1,140	1,050	1,460	1,280	870	646	598	630	710
23	790	790	1,140	1,050	1,460	1,230	870	654	614	630	686
24	790	790	1,180	1,100	1,550	1,230	830	654	606	630	686
25	.....	.....	1,180	1,050	1,650	1,230	830	646	606	630	686
26	.....	.....	1,180	1,100	1,750	1,280	830	638	614	630	686
27	.....	.....	1,180	1,100	1,800	1,280	790	638	622	630	694
28	.....	.....	1,230	1,100	1,850	1,280	790	638	630	630	694
29	.....	.....	1,230	.....	1,850	1,230	750	630	638	630	697
30	.....	.....	1,200	1,100	1,800	1,200	790	614	646	630	700
31	790	.....	1,200	.....	1,700	.....	750	.....	646	630	.....

NOTE.—Mean discharge estimated as follows: Oct. 1–19, 780 second-feet; Oct. 25–30, 790 second-feet; Nov. 25–30, 800 second-feet; Jan. 1–10, 1,120 second-feet; Jan. 11–31, 1,050 second-feet; Feb. 1–5, 1,050 second-feet; Feb. 6–8, 1,100 second-feet; Mar. 10–15, 1,160 second-feet; May 3–10, 1,040 second feet; Sept. 1–6, 650 second-feet. Daily discharge Apr. 30 to May 2 and May 11–16 obtained by adding the recorded discharge of Sprague River to the discharge of Williamson River above the Sprague, computed from a gage reading May 2, and comparison made in Apr. and May, when there was no obstruction.

Monthly discharge of Williamson River below Sprague River near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	790	.....	784	48,200
November	830	790	819	48,700
December	1,230	960	1,070	65,800
January	.....	.....	1,070	65,800
February	1,280	1,050	1,110	61,600
March	1,850	1,100	1,340	82,400
April	1,600	1,200	1,370	81,500
May	1,160	750	935	57,500
June	750	614	675	40,200
July	646	582	601	37,000
August	654	622	629	38,700
September	710	.....	686	40,800
The year	1,850	582	923	668,000

Combined monthly discharge of Williamson River and Modoc Point canal at flume No. 1, near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	1,170	766	947	58,200
June	774	617	692	41,200
July	670	612	629	38,700
August	670	635	650	40,000
September	720	.....	696	41,400
The year	1,850	612	930	674,000

NOTE.—See previous table for October to April.

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

LOCATION.—In sec. 30, T. 38 S., R. 9 E., at outlet of Upper Klamath Lake, about 2 miles northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 28 to October 22, 1904; January 7, 1906, to September 30, 1918.

GAGE.—Friez water-stage recorder since February 16, 1906; vertical staff prior to that date. Zero is 4,136.13 feet above sea level, 1918 readings have been reduced to a datum of 4,100 feet. During 1904 vertical staff on Pelican Bay; zero 4,135,997 feet above sea level.[1] Operation of water-stage recorder unsatisfactory a considerable part of the time. Inspected by employees of United States Reclamation Service.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 42.13 feet at 10 p. m., April 12; minimum stage from water-stage recorder, 39.63 feet at 5 a. m., November 5, but the lake may have reached a lower stage during July when recorder was not operating.

1904 and 1906–1918: Maximum stage of Upper Klamath Lake for the period was 4,143.33 feet, April 23, 24, and 27, 1907. Minimum stage recorded 39.63 feet, September 2 and November 5, 1917.

FLUCTUATION.—Gage heights are very much affected by the wind. The water is lowered near the outlet when the wind blows from the south and is raised as much above its normal level when the wind is in the opposite direction. There is a periodic oscillation when the wind blows for any length of time.

COOPERATION.—Since May, 1909, this station has been maintained by the United States Reclamation Service.

[1] U. S. Geol. Survey Bull. 556, p. 86, 1914.

Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	40.53	40.53	.....	.....	.....	41.45	41.03	.....	39.93	.....	.....
2	.....	40.47	.....	.....	41.33	41.13	41.55	41.03	.....	.....	.....	.....
3	.....	40.38	.....	.....	.....	41.18	41.40	41.03	.....	.....	.....	.....
4	.....	40.35	.....	.....	.....	41.18	41.23	41.03	.....	.....	.....	.....
5	.....	.....	.....	41.13	.....	41.23	41.17	.....	.....	.....	.....	.....
6	40.28	.....	.....	.....	.....	41.38	41.15	.....	.....	39.93	39.98	40.03
7	.....	.....	.....	.....	41.33	41.38	41.08	.....	40.50	.....	.....	.....
8	.....	.....	40.63	.....	.....	41.30	40.90	.....	40.43	.....	.....	.....
9	.....	.....	.....	.....	.....	41.10	41.30	.....	40.33	39.98	.....	.....
10	.....	40.48	.....	41.23	.....	41.10	41.23	.....	40.38	.....	.....	.....
11	.....	.....	.....	.....	.....	40 98	41.35	40.83	40.40	.....	.....	40.08
12	.....	.....	.....	.....	.....	41.15	41.33	40.88	40.33	.....	.....	.....
13	40.48	.....	.....	.....	.....	41.18	41.33	40.85	40.35	.....	40.08	.....
14	40.48	.....	.....	.....	.....	41.23	41.35	40.93	40.55	.....	.....	40.13
15	40.50	.....	40.73	.....	.....	41.25	41.30	40.90	40.38	.....	.....	.....
16	40.78	.....	.....	.....	.....	41.10	41.30	40.85	40.13	.....	.....	.....
17	40.73	40.53	.....	.....	.....	.....	41.28	40.85	.....	39.68	.....	.....
18	40.50	.....	.....	.....	41.20	41.13	41.30	40.85	.....	.....	.....	40.13
19	40.40	.....	.....	41.23	41.30	.....	41.20	.....	.....	.....	40.03	.....
20	40.43	.....	.....	.....	41.30	.....	41.20	.....	.....	.....	.....	.....
21	40.43	40.58	.....	.....	41.33	.....	41.18	40.73	40.23	.....	.....	40.03
22	40.45	.....	.....	.....	41.35	.....	41.15	40.73	.....	.....	.....	.....
23	.....	.....	.....	.....	41.35	41.23	41.13	40.90	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	41.08	41.15	40.73	.....	39.93	40.08	.....
25	.....	40.58	.....	.....	.....	41.30	41.20	40.75	.....	.....	.....	.....
26	40.75	40.60	40.89	41.28	.....	41.35	41.10	40.95	.....	.....	.....	.....
27	40.73	40.65	.....	.....	41.13	41.30	41.08	40.75	.....	.....	.....	.....
28	40.70	.....	.....	.....	.....	41.38	41.10	40.73	.....	.....	.....	.....
29	40.50	.....	41.03	.....	.....	41 40	41.13	40.48	.....	.....	.....	.....
30	40.40	.....	.....	.....	.....	41.33	41.13	40.43	.....	.....	.....	40.28
31	40.50	.....	.....	.....	.....	41.35	.....	.....	.....	39.98	40.08	.....

LINK RIVER AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 38 S., R. 9 E., at county bridge over Link River at Klamath Falls, Klamath County, 1½ miles below outlet of Upper Klamath Lake and immediately above head of Lake Ewauna.

DRAINAGE AREA.—3,110 square miles.

RECORDS AVAILABLE.—May 15, 1904, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank, about 500 yards above bridge in NW. ¼ sec. 32; elevation of zero is 4,080.0 feet above sea level. Friez recorder on opposite bank and a little farther upstream was used June 6, 1908, to August 30, 1912. Chain gage on the bridge used 1904 to 1908. Observers, Myrtle Ess and Marie Talbot.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel deep, current sluggish at low water. Rocks and boulders in rapids; mud and sand at bridge. The control for the gage is evidently permanent and water from the tailrace of the California-Oregon Power Co.'s plant, which enters the river opposite the gage, appears to affect it the same as if it came down the river channel. The stage-discharge relation at the chain gage is affected by backwater from Lake Ewauna, especially when the wind is blowing.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.90 feet at 3 p. m. April 1 (discharge, 3,350 second-feet); minimum stage during year, 4.07 feet at 3.30 p. m. July 18, determined by leveling (discharge estimated at 22 second-feet; river dry at outlet of Upper Klamath Lake).

1904–1918: Maximum stage, 7.30 feet at gage at bridge May 12, 1904, determined May 15, 1904, from high-water marks (discharge, 9,400 second-feet); minimum stage, that of 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSION.—The main or "A" canal of the Klamath project of the United States Reclamation Service diverts water from Link River immediately below the lower end of Upper Klamath Lake. Record is kept of this diversion. (See p. 278.) Some water is also diverted for irrigation from the tributaries to Upper Klamath Lake, but the total run-off is as yet only slightly affected.

REGULATION.—The only artificial regulation is caused by operation of power plant and is small. Marked natural fluctuations are caused by effect of wind on Upper Klamath Lake.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Operation of recorder satisfactory October 1 to December 19 and March 23 to September 30, except at extreme low stage, and fairly satisfactory for the balance of time except for days when discharge was interpolated or computed from gage heights for parts of days. Daily discharge ascertained by use of discharge integrator except as noted in footnote to table. Records good except those for days when discharge is less than 400 second-feet, which are poor.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Link River at Klamath Falls, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 15	5.71	1,570
July 18	[a] 4.07	[b] 22
19	4.68	557

[a] Determined by leveling.
[b] Including 10 second-feet in river and 12 second-feet in tailrace of power plant, practically all seepage and spring water; river dry at outlet of lake.

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	980	1,030	1,230	1,940	2,360	2,000	3,030	2,020	1,310	430	160	640
2	950	970	1,130	2,030	2,180	2,140	3,110	1,890	1,190	450	360	800
3	950	900	1,170	1,870	2,220	.....	3,030	1,930	1,190	440	380	960
4	950	920	1,130	1,960	1,940	.....	2,810	2,060	1,170	440	[a] 420	900
5	930	970	1,190	1,890	2,010	.....	2,790	1,870	1,170	500	460	910
6	920	1,320	[a] 1,420	1,870	2,140	.....	2,580	1,830	1,180	500	400	840
7	970	1,130	[a] 1,640	1,940	2,280	.....	2,460	1,790	1,110	460	440	800
8	950	1,010	1,870	2,000	2,280	.....	2,140	1,790	1,110	400	420	[a] 780
9	970	1,030	1,810	[a] 2,040	2,280	2,210	2,170	1,450	970	380	470	760
10	970	980	1,860	[a] 2,100	2,320	2,290	2,280	1,590	990	490	450	800
11	970	940	1,850	[a] 2,140	2,350	2,290	[a] 2,450	1,420	1,000	500	530	810
12	980	1,100	1,850	2,180	2,370	2,370	[a] 2,630	1,420	940	440	580	710
13	960	1,210	1,770	.....	2,530	2,440	2,800	1,410	980	280	570	680
14	1,010	1,230	1,750	.....	2,500	2,430	2,680	1,480	1,100	250	340	790
15	1,050	1,170	1,600	.....	[a] 2,390	2,400	2,620	1,410	1,010	320	490	990
16	1,170	1,170	1,590	.....	2,280	2,360	2,620	1,400	790	350	500	980
17	1,020	1,130	1,620	.....	.....	2,000	2,570	1,440	990	440	660	970
18	990	1,110	1,760	.....	.....	2,110	2,550	1,460	1,010	320	[a] 640	930
19	1,000	1,110	1,750	2,430	.....	2,370	2,460	1,530	920	560	620	940
20	960	1,120	1,780	[a] 2,410	.....	2,400	2,430	1,560	920	630	570	940
21	930	1,150	1,810	[a] 2,400	.....	2,320	2,350	1,490	920	580	560	830
22	960	1,130	1,800	[a] 2,380	.....	2,310	2,390	1,470	880	600	600	1,000
23	980	1,130	1,810	2,360	.....	2,370	2,370	1,520	.....	600	550	930
24	1,070	1,130	1,880	2,360	.....	2,330	2,350	1,460	.....	490	480	940
25	1,000	1,130	1,850	[a] 2,430	2,000	2,400	2,280	1,430	.....	520	560	1,000
26	990	1,050	[a] 1,840	2,510	2,090	2,650	2,160	1,570	.....	600	580	1,040
27	1,120	1,010	[a] 1,820	2,520	2,070	2,650	2,010	1,480	.....	520	600	930
28	1,100	980	1,800	2,460	2,000	2,650	2,090	1,610	.....	470	670	780
29	1,030	1,080	1,940	2,600	.....	2,680	2,110	1,330	510	420	600	860
30	1,020	1,120	1,940	2,460	.....	2,670	2,090	1,390	440	300	590	910
31	1,030	.....	1,900	2,500	.....	2,850	.....	1,360	.....	320	590	.....

[a] Interpolated.

NOTE.—Mean discharge estimated as follows: Jan. 13–18, 2,300 second-feet; Feb. 17–24, 2,140 second-feet; Mar. 3–8, 2,180 second-feet; June 23–28, 700 second-feet.

Monthly discharge of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,170	920	1,000	61,500
November	1,320	900	1,060	64,300
December	1,940	1,130	1,680	103,000
January	2,600	1,870	2,240	138,000
February	2,530	1,940	2,200	122,000
March	2,850	2,000	2,350	144,000
April	3,110	2,090	2,480	148,000
May	2,060	1,330	1,580	97,200
June	1,310	440	933	55,500
July	630	250	452	27,800
August	670	160	511	31,400
September	1,040	640	872	51,900
The year	3,110	160	1,440	1,040,000

Daily discharge, in second-feet, of Link River and "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2,130	1,510	749	433	783
2	.....	2,030	1,380	741	760	947
3	.....	2,090	1,410	669	791	1,100
4	.....	2,310	1,410	652	831	1,020
5	.....	2,170	1,410	712	860	1,010
6	.....	2,130	1,420	712	790	938
7	.....	2,100	1,410	680	830	897
8	.....	2,130	1,450	646	799	873
9	.....	1,870	1,340	626	828	845
10	.....	2,000	1,390	736	769	878
11	.....	1,810	1,420	746	821	888
12	.....	1,810	1,360	686	826	786
13	.....	1,790	1,410	509	834	747
14	.....	1,850	1,530	496	604	849
15	2,630	1,790	1,450	575	754	1,050
16	2,640	1,770	1,190	614	773	1,040
17	2,590	1,810	1,330	695	856	1,030
18	2,570	1,800	1,430	549	787	988
19	2,480	1,840	1,350	842	757	1,000
20	2,450	1,840	1,330	903	707	993
21	2,380	1,810	1,340	853	687	881
22	2,430	1,830	1,300	891	727	1,050
23	2,430	1,900	1,120	919	677	977
24	2,410	1,850	1,080	838	607	985
25	2,360	1,830	1,100	878	687	1,040
26	2,240	1,930	1,080	968	707	1,080
27	2,100	1,790	1,080	888	727	969
28	2,180	1,860	1,080	838	815	801
29	2,190	1,570	868	788	745	872
30	2,190	1,630	778	679	731	934
31	.....	1,570	.....	720	727	.....

Monthly discharge of Link River and "A" canal at Klamath Falls, Oreg., ending Sept. 30, 1918.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
October	1,170	920	1,0
November	1,320	900	1,0
December	1,940	1,130	1,6
January	2,600	1,870	2,2
February	2,530	1,940	2,2
March	2,850	2,000	2,3
April	3,110	2,100	2,5
May	2,310	1,570	1,8
June	1,510	778	1,2
July	968	496	7
August	860	433	7
September	1,100	747	9
The year	3,110	433	1,5

KLAMATH RIVER AT SPENCER BRIDGE, NEAR KENO, OREG.

LOCATION.—In sec. 32, T. 39 S., R. 7 E., at highway bridge 1 mile bel Creek, 6 miles below former station at Keno, and 18 miles west of Kla Klamath County, on road to Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1913, to September 30, 1918. Recor May 31, 1904, to December 31, 1913, give results smaller by the rela flow contributed by Spencer Creek.

GAGE.—Vertical staff near upstream end of first concrete pier at east en Datum lowered 1.0 foot June 21, 1918. Gage reader, Esther Anderso

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon br wading at low water just above the bridge.

CHANNEL AND CONTROL.—Heavy gravel and boulders; practically perm very even.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.4 datum) April 2 and 4 (discharge, 3,070 second-feet); minimum stag 0.38 foot August 3 (discharge, 386 second-feet).

1904–1918: Maximum stage recorded at Keno, 15.3 feet about Ma from high-water marks observed May 31 (discharge, 9,250 second-feet) stage recorded that of 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Only a small quantity of water diverted below Klamath F At times water finds its way into Lower Klamath Lake through Klam at other times the flow is into the river. Much of the winter flow of is diverted into Klamath River between Klamath Falls and Keno st

REGULATION.—Some natural regulation due to effect of wind on the wide fl of river above Keno.

ACCURACY.—Stage-discharge relation practically permanent. Rating cu below gage height 1.2 feet and is well defined. Gage read about th week to hundredths. Daily discharge ascertained by applying the reading to rating table. Results good except June, during which there gage record, and July, during which the wind caused large diurnal fl

COOPERATION.—Field data furnished by United States Reclamation Ser Bond, project manager, Klamath project.

Discharge measurements of Klamath River at Spencer Bridge near Keno, Oreg., during the year ending Sept. 30, 1916.

[Made by H. W. [illegible].]

Date	Gage height	Dis-charge
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Daily discharge, in second-feet, of Klamath River at Spencer Bridge near Keno, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1–31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Monthly discharge of Klamath River at Spencer Bridge, near Keno, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet: Maximum.	Minimum.	Mean.	[illegible]
October	[illegible]	[illegible]	[illegible]	[illegible]
November	[illegible]	[illegible]	[illegible]	[illegible]
December	[illegible]	[illegible]	[illegible]	[illegible]
January	[illegible]	[illegible]	[illegible]	[illegible]
February	[illegible]	[illegible]	[illegible]	[illegible]
March	[illegible]	[illegible]	[illegible]	[illegible]
April	[illegible]	[illegible]	[illegible]	[illegible]
May	[illegible]	[illegible]	[illegible]	[illegible]
June	[illegible]	[illegible]	[illegible]	[illegible]
July	[illegible]	[illegible]	[illegible]	[illegible]
August	[illegible]	[illegible]	[illegible]	[illegible]
September	[illegible]	[illegible]	[illegible]	[illegible]
The year	[illegible]	[illegible]	[illegible]	[illegible]

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, fairly permane
rflow at gage.
rom water-stage
eet); minimum st
e, 10 second-feet).
11.25 feet, April

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ient. Rating cur
ept for a few gap
ite true. Daily d
ily gage height o

ng the year ending S

Date.	Gage height
	Feet.
[M]ay 21	0.85
[J]une 17	.45
[A]ug. 3	.26

Oreg., for the yea[r]

June.	July.	Aug
42	17	1
41	17	1
39	16	1
37	16	1
36	16	1
34	15	1
32	15	1
31	15	1
29	14	1
28	14	1
27	14	1
26	14	1
26	14	1
25	14	1
25	14	1
24	14	1
22	14	1
20	14	1
20	14	1
19	14	1
19	14	1
19	14	1
19	14	1
18	15	1
18	16	1
17	16	1
18	15	1
17	15	1
17	14	1
18	14	1
....	14	1

. 13–17, 30 second-
April 27 to May 3, 1

KLAMATH RIVER NEAR SEIAD VALLEY, CALIF.

LOCATION.—In NE. ¼ sec. 13, T. 46 N., R. 12 W., above highway bridge, 300 feet above mouth of Walker Creek, 1½ miles southeast of Seiad Valley, Siskiyou County, and 11½ miles below mouth of Scott River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1912, to September 30, 1918.

GAGE.—Staff in five sections fastened to trees on left bank one-fourth mile above highway bridge; read by M. J. Brickley.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet April 4 (discharge, 6,170 second-feet); minimum stage recorded, 2.05 feet November 25 (discharge, from extension of rating curve, about 320 second-feet). (Controlled by dam above.)

1913–1918: Maximum stage recorded, 13.3 feet at 9.30 p. m., December 31, 1913 (discharge, from extension of rating curve, about 26,500 second-feet); minimum stage recorded, 2.05 feet November 25, 1917 (discharge, 320 second-feet).

DIVERSIONS.—Water is diverted from main river and tributaries above the station for use in irrigation, placer mining, and power developments.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 1,000 and 4,000 second-feet, fairly well defined between 4,000 and 10,000 second-feet, and extended above 10,000 and below 1,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent above 1,000 second-feet and fair below.

The following discharge measurement was made by J. F. Kunesh:

September 16, 1918: Gage height, 3.34 feet; discharge, 1,280 second-feet.

Daily discharge, in second-feet, of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,610	2,120	6,380	5,550	3,830	4,200	5,150	3,830	2,260	1,160	655	1,160
2	1,610	2,120	5,550	5,350	4,390	4,200	5,550	4,010	2,120	1,160	585	1,160
3	1,610	2,120	4,200	1,730	4,390	4,200	5,750	4,390	2,120	1,160	585	1,160
4	1,610	2,120	4,580	4,200	4,390	4,200	6,170	4,390	2,120	1,160	655	950
5	1,610	2,120	4,200	5,550	3,830	4,010	5,550	4,390	2,120	1,160	655	950
6	1,610	2,120	4,200	5,550	3,480	3,830	4,770	4,390	2,120	1,160	655	905
7	1,610	2,260	4,390	5,550	5,550	3,830	4,770	4,390	2,120	1,160	655	905
8	1,610	2,260	4,580	5,150	5,350	3,830	4,390	4,390	2,120	1,160	730	905
9	1,610	2,120	3,830	1,380	4,580	4,010	4,960	4,390	2,120	1,160	730	950
10	1,610	2,120	3,830	3,830	4,390	4,010	4,580	3,650	2,120	1,050	730	1,050
11	1,610	2,120	3,830	3,480	4,200	4,010	4,580	3,310	1,990	950	730	1,160
12	1,730	2,120	4,010	3,830	4,390	4,010	4,770	2,990	1,990	950	730	1,270
13	1,730	2,260	4,200	5,150	4,390	3,830	4,960	2,990	1,610	950	730	1,490
14	1,730	950	4,200	4,390	4,390	3,830	4,960	2,990	1,380	950	815	1,490
15	1,730	950	4,390	4,390	4,390	3,830	4,770	2,990	1,380	950	815	1,490
16	1,730	2,120	3,830	4,390	4,390	3,830	4,770	2,840	1,380	950	815	1,270
17	1,860	655	4,010	4,390	4,390	3,830	4,390	2,690	1,380	950	815	1,270
18	1,860	520	4,580	4,390	4,390	3,830	4,390	2,690	1,380	950	815	1,270
19	1,860	2,120	4,580	4,390	4,010	4,580	4,200	2,690	1,380	950	815	1,270
20	1,860	950	4,580	4,010	4,010	4,770	4,200	2,690	1,380	950	815	1,270
21	1,860	815	4,580	4,010	4,010	4,770	4,200	2,690	1,380	950	905	1,270
22	1,860	815	4,580	3,830	4,200	4,770	4,390	2,540	1,380	950	905	1,270
23	1,860	815	4,390	3,830	4,200	4,770	4,390	2,400	1,380	1,050	950	1,270
24	1,990	815	4,200	4,010	4,200	4,580	4,390	2,400	1,380	1,050	950	1,380
25	1,990	320	4,200	3,830	4,200	5,350	4,200	2,400	1,270	1,050	950	1,380
26	1,990	520	4,010	3,830	4,200	5,350	4,010	2,400	1,160	950	950	1,380
27	1,990	950	3,480	3,830	4,200	5,150	4,010	2,400	1,160	905	1,050	1,490
28	1,990	2,690	4,580	3,830	4,200	5,150	4,010	2,400	1,160	905	1,050	1,490
29	1,990	815	5,550	3,650	.....	5,150	4,010	2,260	1,160	905	1,160	1,490
30	1,990	4,200	5,350	3,650	.....	5,150	3,830	2,260	1,160	815	1,160	1,490
31	1,990	.....	1,490	3,480	.....	5,150	.....	2,260	.....	655	1,160	.....

Monthly discharge of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,990	1,610	1,780	109,000
November	4,200	320	1,630	97,000
December	6,380	1,490	4,330	266,000
January	5,550	1,380	4,140	255,000
February	5,550	3,830	4,300	239,000
March	5,350	3,830	4,390	270,000
April	6,170	3,830	4,640	276,000
May	4,390	2,260	3,150	194,000
June	2,260	1,160	1,640	97,600
July	1,160	655	1,010	62,100
August	1,160	585	830	51,000
September	1,490	905	1,240	73,800
The year	6,380	320	2,750	1,990,000

KLAMATH RIVER NEAR REQUA, CALIF.

LOCATION.—In sec. 29, T. 13 N., R. 2 E., at Scofield Ferry, about 9 miles above Requa, Del Norte County and mouth of river and 30 miles below mouth of Trinity River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 25, 1910, to September 30, 1918.

GAGE.—Staff in four sections on right bank at ferry cable; read by S. A. McBeth and Charles McBeth.

DISCHARGE MEASUREMENTS.—Made from ferry cable.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.8 feet at 8.10 a. m. December 1 (discharge, 65,300 second-feet); minimum stage recorded, 4.85 feet August 11 and 12 (discharge, 1,490 second-feet).

1911–1918: Maximum stage recorded, 33.3 feet at 1 p. m. February 2, 1915 (discharge, from extension of rating curve, about 182,000 second-feet); minimum stage recorded, 4.85 feet August 11 and 12, 1918 (discharge, 1,490 second-feet).

DIVERSIONS.—Water is diverted for irrigation and power from main river and tributaries in Oregon and California.

REGULATION.—Effect of regulation is believed to be small.

ACCURACY.—Stage-discharge relation changed December 1. Rating curves fairly well defined between 1,500 second-feet and 3,000 second-feet, well defined between 3,000 and 60,000 second-feet; coincide at 6.6 feet and are extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good, except estimated periods, which are fair.

The following discharge measurement was made by J. F. Kunesh:

September 4, 1918: Gage height, 5.03 feet; discharge, 1,640 second-feet.

Daily discharge, in second-feet, of Klamath River near Requa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,760	3,100	65,300	13,200	10,000	16,000	27,900	15,600	7,320	3,120	1,810	1,620
2	2,760	3,100	31,300	11,700	10,700	16,000	26,800	16,000	7,040	2,950	1,810	1,810
3	2,760	3,100	15,600	12,000	12,800	16,000	24,400	16,000	6,480	2,950	1,810	1,620
4	2,760	3,240	12,400	12,800	15,600	16,000	21,200	16,800	6,480	2,950	1,810	1,620
5	2,760	3,380	8,200	12,000	19,000	15,600	20,300	15,200	6,760	2,790	1,710	1,710
6	2,760	3,720	.....	11,400	23,000	15,600	19,400	14,000	7,040	2,630	1,620	1,810
7	2,760	4,500	.....	12,800	25,400	15,200	19,400	13,600	6,760	2,630	1,620	1,810
8	2,760	3,720	.....	12,800	33,700	15,200	19,400	12,800	6,760	2,630	1,620	1,810
9	2,760	3,720	.....	12,000	31,300	15,600	23,000	12,000	6,480	2,330	1,580	1,810
10	2,760	3,380	.....	12,000	24,800	15,600	31,300	11,400	6,200	2,330	1,580	1,830
11	2,760	5,420	.....	12,000	19,400	16,000	28,400	11,400	5,940	2,330	1,490	1,810
12	2,760	5,420	.....	21,200	19,000	17,600	24,800	11,000	5,680	2,330	1,490	1,810
13	2,760	5,420	.....	22,100	18,500	19,400	19,000	10,700	5,420	2,330	1,530	1,810
14	2,760	3,720	.....	23,000	19,400	18,500	19,400	10,400	5,180	2,330	1,580	1,930
15	2,660	2,860	.....	21,600	20,300	17,200	19,000	10,000	4,940	2,330	1,620	1,930
16	2,760	2,660	.....	19,000	22,100	18,500	18,500	9,400	4,500	2,330	1,710	2,100
17	2,860	2,660	.....	18,500	22,600	23,000	18,500	8,800	4,300	2,190	1,810	2,050
18	2,860	2,580	.....	18,500	23,000	26,800	18,500	8,800	4,100	2,050	1,810	2,630
19	2,860	2,510	.....	12,400	21,200	27,900	17,600	8,800	4,100	2,050	1,810	2,330
20	2,860	2,660	.....	12,400	18,500	30,700	18,000	8,500	4,100	2,050	1,810	2,330
21	2,860	2,860	.....	12,400	17,600	27,400	17,200	8,500	4,100	1,930	1,710	2,470
22	2,860	2,860	.....	10,700	16,000	25,800	16,800	8,500	3,900	1,810	1,710	2,330
23	2,860	2,580	.....	10,000	16,400	26,800	16,800	8,200	3,700	1,810	1,810	2,190
24	2,860	2,580	.....	10,400	17,200	27,900	17,200	8,200	3,700	2,050	1,810	2,330
25	2,860	2,400	.....	10,400	17,200	39,700	17,600	8,200	3,500	2,050	1,710	2,330
26	2,860	2,230	.....	10,700	18,500	37,300	17,600	7,900	3,300	2,050	1,620	2,330
27	2,860	2,160	.....	11,000	17,600	33,100	16,400	7,900	3,300	1,930	1,620	2,330
28	2,980	2,090	.....	11,400	16,400	28,400	16,000	7,600	3,300	1,930	1,530	2,470
29	2,980	9,400	.....	11,000	.....	26,400	15,200	7,600	3,300	1,930	1,530	2,330
30	2,980	34,900	23,000	10,700	.....	27,400	15,200	7,320	3,120	1,810	1,580	2,470
31	2,980	.....	14,400	10,700	.....	27,900	.....	7,040	.....	1,810	1,620	.....

NOTE.—Discharge estimated as follows: Dec. 6–10, 6,600 second feet; Dec. 11–25, 6,100 second feet; Dec. 26–29, 28,000 second feet.

Monthly discharge of Klamath River near Requa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,980	2,660	2,820	173,000
November	34,900	2,090	4,500	268,000
December	65,300	.....	13,100	812,000
January	23,000	10,000	13,600	836,000
February	33,700	10,000	19,500	1,080,000
March	39,700	15,200	22,600	1,390,000
April	31,300	15,200	20,000	1,190,000
May	16,800	7,040	10,600	652,000
June	7,320	3,120	5,030	299,000
July	3,120	1,810	2,280	140,000
August	1,810	1,490	1,670	103,000
September	2,630	1,620	2,060	123,000
The year	65,300	1,490	9,760	7,070,000

SCOTT CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 18, T. 31 S., R. 7 E., 4 miles west of Bend-Fort Klamath road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 16 to September 30, 1917, and May 1 to August 7, 1918.

GAGE.—Vertical staff on right bank of creek; no observer, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of pumice. Banks covered with brush. No defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.02 feet July 15, 1917 (discharge, 31 second-feet); minimum stage recorded, 1.04 feet July 31, 1918 (discharge, 6.9 second-feet).

ICE.—No record during winter period.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—An estimate of the mean monthly flow believed to be fairly reliable has been made by comparison with record of flow of Sand Creek.

Discharge measurements of Scott Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 18	1.08	7.0	June 22	1.26	11.0
May 7	1.25	11.2	July 31	1.04	6.9
June 6	1.23	10.6			

Monthly discharge of Scott Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Month.	Discharge in second-feet. (mean).	Run-off in acre-feet.
May	11.3	694
June	10.9	651
July	8.19	503
Aug. 1–7	6.86	95
The period	.....	1,940

NOTE.—Estimate based on comparison of 9 simultaneous measurements of each stream, which indicated flow of Scott Creek to be 39 per cent of Sand Creek.

SAND CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 29, T. 31 S., R. 7 E., 3½ miles above bridge on Bend-Fort Klamath road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 15 to September 30, 1917, and May 1 to August 7, 1918.

GAGE.—Stevens 8-day recorder on north bank of creek, opposite vertical staff used in 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Stream bed of shifting pumice. No defined control. Banks low but well defined at gage; about 100 yards below gage the stream, spreads and some water disappears in the pumice soil.

EXTREMES OF DISCHARGE.—Maximum stage during period May 1 to August 7 from water stage recorder 0.76 feet, May 10 and 19, June 12 and 13 (discharge, 32 second-feet; minimum stage from recorder 0.48 foot August 7 (discharge, 16 second-feet).

ICE.—Stream freezes in winter; no record.

DIVERSIONS.—None.

REGULATION.—None

ACCURACY.—Stage-discharge relation practically permanent during season; rating curve well defined. Operation of recorder satisfactory during May and June and first week of August; no record during July. Daily discharge ascertained by applying to rating table the mean gage heights obtained by inspecting the recorder graph. Records good.

Discharge measurements of Sand Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	R. C. Briggs	0.73	20.7	June 22	R. C. Briggs	.69	27.8
May 1	F. F. Henshaw	.69	25.8	July 31	do	.53	18.4
June 6	R. C. Briggs	.71	28.2				

Daily discharge, in second-feet, of Sand Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Day.	May.	June.	Aug.	Day.	May.	June.	Aug.	Day.	May.	June.	Aug.
1	28	a 27	18	11	30	30	.....	21	a 30	a 27	.....
2	30	a 28	18	12	29	30	.....	22	28	27	.....
3	30	a 28	18	13	29	32	.....	23	28	27	.....
4	30	a 28	18	14	30	a 32	.....	24	28	26	.....
5	30	a 29	17	15	30	a 31	.....	25	28	26	.....
6	30	29	17	16	30	a 31	.....	26	28	26	.....
7	30	29	17	17	29	a 30	.....	27	27	25	.....
8	30	29	.....	18	30	a 29	.....	28	26	24	.....
9	31	30	.....	19	29	a 28	.....	29	26	24	.....
10	30	30	.....	20	31	a 28	.....	30	a 26	24	.....
								31	a 27	.....	.....

a Interpolated.

Monthly discharge of Sand Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	31	26	29.0	1,780
June	32	24	28.1	1,670
July	.....	.....	a 21.0	1,290
August 1-7	18	17	17.6	244
The period	.....	.....	.....	4,980

a Estimated.

NORTH FORK OF SPRAGUE RIVER NEAR BLY, OREG.

LOCATION.—In sec. 35, T. 35 S., R. 14½ E., at Dennis ranch, 10 miles north of Bly, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 18 to September 30, 1917, and March 27 to July 31, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank, one-fourth mile above a diversion dam and 1¼ miles above ranch buildings. New gage installed April 11, 1918, 200 feet above old gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of coarse gravel; practically permanent at new gage; part of old beaver dam affected stage-discharge relation at old gage at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.60 feet on old gage April 9 (discharge, 208 second-feet); minimum stage recorded, 0.18 feet July 6–11 (discharge, 14 second-feet), minimum, including Sprague River Irrigation Co. canal, 35 second-feet July 16.

ICE.—Stream freezes; no winter records.

DIVERSIONS.—Sprague River Irrigation Co. canal diverts water around gage (see p. 266). Several small ditches divert from the upper tributaries.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 11, owing to relocation of gage; poorly-defined rating curve used for old gage, March 27 to April 10; well defined curve used April 11 to July 31. Gage read practically every day to hundredths. Daily discharge ascertained by applying daily gage reading to rating table. Records good.

Discharge measurements of North Fork of Sprague River near Bly, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 27	2.49	73	May 22	0.44	66
Apr. 11	[a] 3.42	182	June 18	.02	25.6
18	.89	143	Aug. 4	.12	34.9
May 4	1.02	148			

[a] Gage reading 1.30 feet on new gage.

Daily discharge, in second-feet, of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Day.	Mar.	Apr.	May.	June.	July.
1	.....	105	145	45	18	16	.....	130	108	28	20
2	.....	112	145	43	18	17	.....	138	94	27	20
3	.....	94	145	41	17	18	.....	130	87	26	20
4	.....	83	145	41	15	19	.....	141	80	24	22
5	.....	83	145	41	15	20	.....	152	72	24	23
6	.....	105	145	39	14	21	.....	167	69	24	23
7	.....	110	130	39	14	22	.....	182	67	24	23
8	.....	116	130	39	14	23	.....	190	62	24	31
9	.....	208	130	35	14	24	.....	190	60	23	32
10	.....	179	130	31	14	25	.....	179	64	23	32
11	.....	190	108	31	14	26	.....	168	62	18	32
12	.....	198	108	32	16	27	73	160	60	18	32
13	.....	175	115	32	19	28	78	145	58	18	36
14	.....	160	115	31	19	29	83	145	53	17	34
15	.....	130	122	29	20	30	83	152	49	18	32
						31	94	.....	47	.....	32

Monthly discharge of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 27-31	94	78	82.2	815
April	208	83	147	8,750
May	145	47	98.4	6,050
June	45	17	29.5	1,760
July	36	14	22.1	1,360
The period				18,700

Combined monthly discharge of North Fork of Sprague River and Sprague River Irrigation Co.'s canal near Bly, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 27-31	94	73	82.2	815
April	208	83	149	8,870
May	162	72	121	7,440
June	70	45	55.6	3,310
July	44	35	39.1	2,400
The year				22,800

SPRAGUE RIVER NEAR BEATTY,[1] OREG.

LOCATION.—In NW. ¼ sec. 20, T. 36 S., R. 13 E., 2 miles above highway bridge on road from Yainax to Silver Lake, 4 miles above mouth of Sycan River, 3 miles east of Beatty post office, and 10 miles east of Yainax, Klamath County.

DRAINAGE AREA.—513 square miles.

RECORDS AVAILABLE.—April 19, 1912, to September 30, 1918, with some breaks due to lack of observer.

GAGE.—Vertical staff gage with inclined lower section on left bank. Stevens water-stage recorder at same location used February 20, 1914, to September 11, 1917. Gage reader, Earl Hamaker.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; no defined control as stream is very sluggish for miles above and below gage; banks subject to overflow at a stage of about 5 feet and considerable water may flow in a cut-off across a bend to the right of the station.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage; at high stages from wagon bridge 2 miles downstream and inflow estimated.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.04 feet March 29 (discharge, 460 second-feet). Minimum stage recorded 0.50 foot June 29 (discharge, 84 second-feet), but the flow may have gone slightly lower in July.

1912–1918: Maximum stage from water-stage recorder 5.75 feet April 24, 1917 (discharge, 1,320 second-feet); minimum stage that of 1918. There was recorded at a station 2 miles downstream on May 21, 1904, a discharge of 2,080 second-feet.

ICE.—Stage-discharge relation seldom affected by ice as stream is spring fed.

DIVERSIONS.—Considerable water is diverted near Bly for irrigation.

REGULATION.—None.

[1] Referred to in previous reports as near Yainax, Oreg.

ACCURACY.—Stage-discharge relation fairly permanent except during summer when it was affected by growth of aquatic plants. Well-defined rating curve used October 1 to May 3; fairly well-defined curve, to allow for effect of aquatic-plant growth, May 20 to June 29. Gage read once a day to hundredths October 1 to March 30 and May 26 to June 29. No observer at other times. Records good except for April and May; records for these months poor on account of fragmentary gage-height record.

Discharge measurements of Sprague River near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 22	0.96	140	May 22	1.56	190
Mar. 23	2.30	326	June 17	.69	99
26	3.00	447	Aug. 4	.75	111
Apr. 20	2.43	347			

Daily discharge, in second-feet, of Sprague River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	139	142	213	174	169	165	.....	a 340	138
2	139	140	213	169	169	167	.....	a 320	136
3	139	142	213	162	165	191	.....	308	134
4	139	142	206	162	162	245	.....	.....	132
5	139	148	203	165	155	254	.....	.....	128
6	139	144	189	157	160	308	.....	.....	126
7	139	146	189	157	165	325	.....	.....	124
8	139	144	186	155	174	325	.....	.....	122
9	136	142	177	162	179	325	.....	.....	118
10	138	144	172	162	179	334	414	.....	114
11	139	140	167	167	179	334	423	.....	108
12	134	144	142	169	177	334	.....	.....	110
13	134	142	144	169	177	342	.....	.....	110
14	134	142	146	169	172	342	.....	.....	108
15	134	140	148	167	167	334	.....	.....	106
16	134	140	151	165	169	342	.....	.....	103
17	134	142	153	162	167	342	.....	.....	100
18	134	138	160	162	162	342	.....	.....	98
19	134	136	167	157	153	342	.....	.....	98
20	134	136	167	155	153	351	351	204	97
21	142	134	155	153	153	360	.....	a 198	98
22	139	134	155	153	155	369	.....	191	97
23	142	136	155	153	157	351	.....	a 175	95
24	142	142	162	151	160	378	.....	159	94
25	140	142	172	157	160	423	.....	a 159	94
26	140	167	179	155	162	441	.....	158	92
27	140	186	201	165	165	432	.....	172	90
28	140	198	213	165	165	450	.....	158	87
29	138	203	216	167	.....	460	.....	153	84
30	140	211	184	172	.....	450	.....	145	a 84
31	142	.....	179	174	.....	a 450	.....	138	.....

a Interpolated or estimated.

NOTE.—Mean discharge estimated as follows: Apr. 1-9, 420 second-feet; Apr. 12-19, 425 second-feet; Apr. 21-30, 405 second-feet; May 4-19, 250 second-feet.

Monthly discharge of Sprague River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	142	134	138	8,480
November	211	134	150	8,920
December	216	142	177	10,900
January	174	151	162	9,960
February	179	153	165	9,160
March	460	165	342	21,000
April	.....	.....	414	24,600
May	.....	138	225	13,800
June	138	84	108	6,430
The period	.....	.....	.....	113,000

SPRAGUE RIVER AT CHILOQUIN, OREG.

LOCATION.—In NE. ¼ sec. 3, T. 35 S., R. 7 E., half a mile above mouth and same distance above Southern Pacific Railroad bridge (where station was located up to Oct. 31, 1914), half a mile below diversion dam of Modoc Point canal of United States Indian Service, and three-fourths mile south of Chiloquin, Klamath County.

DRAINAGE AREA.—1,550 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1918; partly fragmentary.

GAGE.—Friez water-stage recorder on right bank 500 feet above wagon bridge, installed June 25, 1917. Vertical staff on wagon bridge was read November 1, 1914, to June 25, 1917, and a chain gage on railroad bridge up to October 31, 1914. Gage inspected by F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and boulders; heavy control, may shift slightly; obstructed by logs, April 29 to May 10, 1918.

EXTREMES OF DISCHARGE.—Maximum open-channel stage recorded during year, from water-stage recorder, 2.27 feet March 28 (discharge, 1,250 second-feet); minimum stage from water-stage recorder, 0.92 foot July 15 and 16 (discharge, 208 second-feet; including Modoc Point canal, 248 second-feet).

1911–1918: Maximum stage recorded 5.3 feet, March 28, 1917 (discharge, 4,490 second-feet); mimimum discharge that of 1918.

ICE.—Stage-discharge relation affected by ice only during short periods of extremely cold weather.

DIVERSIONS.—The Modoc Point canal, completed in 1915, diverted some water around the gage, of which a record was kept (see p. 275). A considerable quantity of water is also diverted for irrigation in the headwaters of Sprague and Sycan rivers.

REGULATION.—Manipulation of sluiceway of diversion dam may cause some fluctuation at the gage.

ACCURACY.—Stage-discharge relation practically permanent, except during period of log obstruction April 29 to May 10. Rating curve well defined. Operation of recorder satisfactory except December 1 to January 12, and for short periods during which discharge is estimated. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good except those for October, December, and January, which are fair.

Discharge measurements of Sprague River at Chiloquin, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. C. Briggs	1.20	358	May 18	W. W. Humphrey [a]	1.44	514
Mar. 18	do	1.47	503	June 6	do	1.14	303
Apr. 4	do	1.72	705	21	R. C. Briggs	1.00	241
23	do	1.60	620	Aug. 1	do	1.01	241
May 2	do	2.58	657				

[a] Engineer employed by United States Reclamation Service.

Daily discharge, in second-feet, of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	.....	350	422	491	.....	428	800	682	386	245	245	232
2	.....	356	440	484	.....	428	755	657	368	240	245	232
3	.....	358	477	484	.....	434	755	.....	362	232	240	236
4	.....	360	505	484	.....	446	755	.....	350	232	236	240
5	.....	362	470	484	.....	464	710	.....	332	232	236	240
6	.....	362	422	476	422	498	665	.....	314	232	236	240
7	.....	368	410	467	452	505	620	.....	314	232	236	240
8	.....	374	422	459	446	491	620	.....	308	232	232	.....
9	.....	374	428	450	470	458	620	.....	308	236	228	.....
10	.....	380	422	442	528	470	580	.....	302	228	232	.....
11	.....	380	446	434	580	484	620	519	296	222	232	.....
12	.....	380	434	422	540	491	665	519	290	217	236	.....
13	.....	380	434	.....	519	519	710	519	285	212	240	.....
14	.....	380	440	.....	491	526	800	519	280	212	245	220
15	.....	380	440	.....	484	533	850	512	275	208	250	222
16	.....	380	440	.....	452	519	850	498	268	208	250	224
17	.....	380	446	.....	440	505	850	491	261	212	255	228
18	.....	.....	452	.....	434	512	800	498	254	216	255	236
19	.....	.....	452	.....	422	540	710	491	247	216	255	236
20	344	.....	458	.....	392	620	665	484	240	216	260	236
21	344	.....	464	.....	398	665	665	477	240	216	265	240
22	344	.....	470	.....	398	755	620	458	245	224	265	245
23	344	.....	477	.....	386	755	620	440	270	232	265	232
24	344	380	484	.....	392	800	665	422	265	236	260	232
25	350	380	484	.....	404	900	665	416	265	236	.....	236
26	350	380	484	.....	422	1,000	710	410	265	236	.....	236
27	350	374	491	.....	422	1,050	755	392	265	240	.....	236
28	350	374	505	.....	422	1,150	755	386	265	240	.....	236
29	350	380	512	.....	.....	1,100	730	380	260	240	.....	240
30	350	401	505	.....	.....	1,050	706	392	245	240	.....	250
31	350	.....	498	.....	.....	900	.....	392	.....	245	.....	.....

NOTE.—Mean discharge estimated as follows: Oct. 1–19, 340 second-feet; Nov. 18–23, 300 second-feet; Jan. 13 to Feb. 5, 420 second-feet; May 3–10, 588 second-feet; Aug. 25–31, 250 second-feet; Sept. 8–13, 230 second-feet.

Combined daily discharge, in second-feet, of Sprague River and Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	688	407	254	285	253	16	509	291	248	274	245
2	663	392	253	285	253	17	502	284	252	295	249
3	.....	386	254	280	257	18	501	277	256	295	257
4	.....	371	254	276	261	19	504	270	256	295	257
5	.....	355	254	276	261	20	497	263	256	300	257
6	.....	336	254	276	261	21	490	263	256	305	261
7	.....	336	254	276	261	22	471	263	264	305	266
8	.....	330	253	272	251	23	453	273	272	305	253
9	.....	330	259	268	251	24	435	268	276	300	253
10	.....	324	272	272	251	25	429	265	276	290	257
11	530	319	261	272	251	26	426	265	276	290	257
12	530	313	256	262	251	27	408	268	280	290	257
13	530	308	252	264	251	28	402	268	280	285	257
14	530	303	252	269	241	29	396	263	280	285	261
15	523	298	248	274	243	30	409	248	280	285	271
						31	411	.....	285	285	.....

Monthly discharge of Sprague River at Chiloquin, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	350	.....	343	21,100
November	401	350	375	22,300
December	512	410	459	28,200
January	491	.....	437	26,900
February	580	.....	443	24,600
March	1,150	428	645	39,700
April	850	580	710	42,200
May	682	380	505	31,100
June	386	240	288	17,100
July	245	208	228	14,000
August	265	228	247	15,200
September	250	220	234	13,900
The year	1,150	208	409	296,000

Combined monthly discharge of Sprague River and Modoc Point River canal at Chiloquin, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	353	.....	346	21,300
November	401	353	376	22,400
December	512	410	459	28,200
January	491	.....	437	26,900
February	580	.....	443	24,600
March	1,160	428	649	39,900
April	855	585	715	42,500
May	688	396	517	31,800
June	407	248	305	18,100
July	285	248	262	16,100
August	305	262	284	17,500
September	271	241	255	15,200
The year	1,160	241	421	304,000

SPRAGUE RIVER IRRIGATION CO.'S CANAL NEAR BLY, OREG.

LOCATION.—In T. 35 S., R. 14 E. probably in sec. 36, 2½ miles below head gate and just below a wasteway, 8 miles north of Bly, Klamath County.

RECORDS AVAILABLE.—April 27 to July 31, 1918.

GAGE.—Vertical staff; read by J. M. McFerren.

CHANNEL AND CONTROL.—Canal section about 16 feet wide on bottom; rock bottom overlain with gravel; practically permanent.

DISCHARGE MEASUREMENTS.—Made from foot bridge about 200 feet above gage or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.30 feet on June 10, 11, 28, July 5, 8, and 12 (discharge, 28 second-feet). Canal dry up to April 27.

ACCURACY.—Stage-discharge relation permanent; rating curve well defined. Gage read daily or every other day to half-tenths. Daily discharge ascertained by applying daily gage reading to rating table. Records good except those for May which are practically estimates.

Discharge measurements of Sprague River Irrigation Co.'s canal near Bly, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	1.60	18.0	June 18	2.10	25.1
24	2.10	23.7	Aug. 4	.75	4.4

Daily discharge, in second-feet, of Sprague River Irrigation Co. canal near Bly, Oreg., for the period, Apr. 27 to July 31, 1918.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1		35	26	11		28	28	21		26	15
2		24	26	12		26	28	22		27	15
3		26	26	13		26	20	23		26	5
4		26	26	14		26	18	24		24	
5		26	28	15		26	17	25		26	
6		24	27	16		25	15	26		27	
7		25	27	17		25	16	27		28	
8		26	28	18		25	17	28		28	
9		27	27	19		25	16	29		28	
10		28	28	20		26	16	30	23	27	
								31	26		

NOTE.—Mean discharge estimated as follows: Apr. 27–30, 15 second-feet; May 1–10, 17 second-feet; May 11–29; July 19–23, as in table; July 24–31, 4 second-feet.

Monthly discharge of Sprague River Irrigation Co. canal near Bly, Oreg., for the period, Apr. 27 to July 31, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April (4 days)			15.0	119
May			22.4	1,380
June	28	24	26.1	1,550
July	28		17.0	1,050
The period				4,100

FIVEMILE CREEK NEAR BLY, OREG.

LOCATION.—In sec. 1, T. 36 S., R. 13 E., 1 mile above mouth and about 8 miles northwest of Bly, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 8, 1917, to September 30, 1918.

GAGE.—Stevens 8-day recorder on left bank; vertical staff used after May 5. Former gage about one-fourth mile above mouth, established April 17, 1917, but no gage readings are available. Gage inspected by F. C. Lange.

DISCHARGE MEASUREMENTS.—Made by wading near gage; high-water measurements can be made from a pole bridge near old gage.

CHANNEL CONTROL.—Channel crooked and lined with thick growth of willows. An artificial control, consisting of a log with sheet piling driven on the upstream side was installed September 14, 1917, but was unsuccessful due to washing around its ends.

EXTREME OF DISCHARGE.—Maximum stage from water-stage recorder for period September 8, 1917, to September 30, 1918, 1.33 feet March 26 (discharge, 40 second-feet). Minimum stage recorded during period was 0.90 foot May 18 (discharge, 19 second-feet).

ICE.—Stream freezes over in cold weather. discharge remains practically steady as it is all from springs.

DIVERSION.—None above gage, two ditches divert between gage and mouth of stream.

REGULATION.—None.

ACCURACY.—Stage discharge relation unstable. Rating curves used as follows: September 18, 1917, to January 20, 1918, poorly defined; March 23 to April 30, fairly well defined; May 4 to July 20 fairly well defined; other periods by interpolation. Recorder operated in a satisfactory manner September 11 to October 7, October 21 to November 25, with gaps, and March 23 to May 4, occasional staff gage readings to hundredths at other times. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph or the staff gage reading. Records good, even when fragmentary, on account of the steady character of the stream.

Discharge measurements of Fivemile Creek near Bly, Oreg., during the years ending Sept. 30, 1917 and 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*
Apr. 17	1.53	37.2	Mar. 28	1.22	36.1	May 4	.94	20.1
18	1.38	33.2	Apr. 1	1.18	33.8	24	.94	20.3
June 30	[a] 1.90	22.4	10	1.08	28.4	June 18	.96	20.4
Sept. 8	[a] 1.80	20.9	15	.98	23.2	Aug. 4	.90	19.5
11	[b] .65	23.2	25	.89	21.1			
Oct. 22	1.04	20.8						

[a] Stage-discharge relation affected by backwater from diversion dam.
[b] On new gage; old gage read 1.90, affected by backwater.

Daily discharge, in second-feet, of Fivemile Creek near Ely, Oreg., for the period Sept. 8, 1917, to Aug. 4, 1918.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	22	22	.....	.....	.....	33	21	21	.....	.....
2	.....	22	22	.....	.....	.....	29	21	.....	.....	.....
3	.....	21	22	23	.....	.....	27	21	.....	.....	.....
4	.....	22	22	.....	.....	.....	27	20	.....	.....	20
5	.....	23	23	.....	.....	.....	27	21	.....	.....	.....
6	.....	22	22	.....	.....	.....	26	21	.....	20	.....
7	.....	22	22	.....	.....	.....	25	21	.....	.....	.....
8	21	.....	22	.....	.....	.....	26	20	.....	.....	.....
9	22	.....	22	.....	.....	.....	29	20	20	.....	.....
10	22	.....	22	.....	.....	.....	29	20	.....	.....	.....
11	23	.....	22	.....	.....	.....	27	20	.....	.....	.....
12	23	.....	.....	.....	23	.....	25	20	.....	.....	.....
13	23	.....	.....	.....	.....	.....	25	20	.....	21	.....
14	22	.....	.....	23	.....	.....	25	20	.....	.....	.....
15	22	.....	.....	.....	.....	.....	25	19	21	.....	.....
16	22	.....	.....	.....	.....	.....	23	19	.....	.....	.....
17	21	.....	.....	.....	.....	.....	23	19	.....	.....	.....
18	20	.....	23	.....	.....	.....	23	19	21	.....	.....
19	21	.....	23	.....	.....	.....	22	19	.....	.....	.....
20	21	.....	23	.....	24	.....	22	19	.....	21	.....
21	21	22	23	.....	.....	.....	22	19	.....	.....	.....
22	21	22	23	.....	.....	.....	21	20	21	.....	.....
23	22	22	23	.....	.....	25	21	20	.....	.....	.....
24	22	22	23	.....	.....	20	21	21	.....	.....	.....
25	21	22	23	.....	.....	38	21	21	.....	.....	.....
26	21	22	.....	.....	.....	40	21	21	.....	.....	.....
27	21	22	.....	.....	.....	33	21	21	.....	.....	.....
28	22	22	.....	.....	.....	33	21	21	.....	.....	.....
29	21	22	.....	.....	.....	36	21	21	20	.....	.....
30	21	22	.....	.....	.....	34	21	21	.....	.....	.....
31	.....	22	.....	.....	.....	34	.....	21	.....	.....	.....

Monthly discharge of Fivemile Creek near Bly, Oreg., for the period Sept. 8, 1917, to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
Sept, 1917	23	20	21.4	1,270
1917–18.				
October	23	21	22.0	1,350
November	23	22	22.5	1,340
December	.....	.....	25.0	1,540
January	.....	.....	23.5	1,440
February	.....	.....	23.0	1,280
March	40	.....	26.1	1,600
April	33	21	24.3	1,450
May	21	19	20.2	1,240
June	.....	.....	20.5	1,220
July	.....	.....	20.7	1,270
August	.....	.....	[a] 20.0	1,230
September	.....	.....	[a] 20.0	1,190
The year	.....	.....	22.3	16,200

[a] Estimated.

SYCAN RIVER NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 21, T. 32 S., R. 14 E., about one-fourth mile above the upper diversion dam for Sycan Marsh, one mile above ZX ranch house and 30 miles south of Silver Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 16, 1905, to May 31, 1906; May 10 to September 30, 1918.

GAGE.—Stevens 8-day recorder on right bank, installed May 15, 1918. Temporary gage installed May 10, 1918 was found to be affected by backwater. Inspected by James Burke.

DISCHARGE MEASUREMENTS.—Made by wading near gage at low and medium stages, from wagon bridge near ranch house at high water.

CHANNEL AND CONTROL.—Gravel bed somewhat shifting, banks of rock and soil, with scattered willows; may overflow right bank at extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during spring observed from high-water marks, about 3.5 feet (discharge estimated from extension of rating curve, at 400 second-feet). Minimum stage recorded, 0.44 feet September 1–3 and 27–30 (discharge 2.9 second-feet.)

ICE.—Stream probably freezes nearly solid in winter.

DIVERSION.—None above station; most of the water is applied to Sycan Marsh by flooding, from several dams and ditches.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent at permanent station beginning May 15. Rating curve well defined. Operation of recorder satisfactory except during August and September, when well may have been silted up. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, except May 10 to 14, when shifting-control method was used. Records good.

Discharge measurements of Sycan River near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 10	.....	105	June 7	1.04	27.3
15	1.79	88	July 28	.53	5.1

Daily discharge, in second-feet, of Sycan River near Silver Lake, Oreg., for the period, May 10 to Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	33	9.8	4.8	2.9	16	86	18	6.2	5.0	11
2	.....	33	9.4	4.8	2.9	17	74	18	5.9	5.0	7.8
3	.....	32	9.0	4.8	2.9	18	64	17	5.6	5.3	6.7
4	.....	31	9.0	4.8	3.1	19	58	16	5.3	5.3	5.9
5	.....	30	8.2	4.8	3.3	20	55	15	5.3	5.0	5.3
6	.....	29	7.0	4.8	3.5	21	52	15	5.6	4.8	4.5
7	.....	27	7.0	4.8	3.5	22	49	15	5.6	4.5	3.8
8	.....	26	7.0	4.8	3.8	23	46	15	5.3	4.2	3.8
9	.....	24	7.0	4.8	3.8	24	43	14	5.3	4.0	3.3
10	105	22	7.0	4.8	3.8	25	43	13	5.3	3.8	3.1
11	100	22	7.0	4.8	4.0	26	45	13	5.3	3.8	3.1
12	90	21	6.7	4.8	4.0	27	56	11	5.0	3.8	2.9
13	85	23	6.4	4.8	3.8	29	48	11	5.0	3.8	2.9
14	80	20	6.4	4.8	3.8	30	42	10	5.0	3.5	2.9
15	88	19	6.4	5.0	11	30	38	10	5.0	3.3	2.9
						31	35	.....	5.0	3.1	.....

Monthly discharge of Sycan River near Silver Lake, Oreg., for the period, May 10 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 10-31	105	35	62.8	2,740
June	33	10	20.1	1,200
July	9.8	5.0	6.42	395
August	5.3	3.1	4.53	279
September	11	2.9	4.33	258
The period	.....	.....	.....	4,870

SYCAN RIVER NEAR BEATTY, OREG.

LOCATION.—In SE. ¼ sec. 8, T. 35 S., R. 12 E., 8 miles by stream above mouth, 11 miles by road north of Beatty, and 18 miles northeast of Yainax, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 29, 1917, to September 30, 1918; November 25, 1911, to October 29, 1917, at station referred to as Sycan River near Yainax.

GAGE.—Stevens water-stage recorder on left bank; inspected by J. L. Richards and A. S. Hotchkin. Vertical staff in sec. 3, T. 36 S., R. 12 E., about 6 miles below present gage, was used 1911 to 1913, and recorder in NW. ¼ sec. 28, about 3 miles below present gage, up to October 29, 1917.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet upstream from gage or by wading.

CHANNEL AND CONTROL.—Stream bed, gravel and small boulders, fairly even; control of small boulders about 100 feet below gage, fairly permanent. One straight channel at all stages; banks not subject to overflow at gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.97 feet at 4 a. m. April 25 (discharge, 760 second-feet); minimum stage from water-stage recorder, 0.20 foot July 22 to 30 (discharge, 10 second-feet).

1911–1918: Maximum stage at station in sec. 28, 11.25 feet, April 25, 1917 (discharge 2,250 second-feet); minimum, that of 1918.

ICE.—Stage-discharge relation apparently unaffected by ice, as most of low-water flow comes from springs.

DIVERSIONS.—Some water is used for irrigation by flooding on Sycan Marsh.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined; operation of recorder fairly satisfactory, except for a few gaps, when discharge has been estimated; paper did not run quite true. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

Discharge measurements of Sycan River near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	0.42	19.3	Mar. 29	1.30	168	May 21	0.85	62
Mar. 22	1.90	343	Apr. 13	1.51	219	June 17	.45	23.1
25	2.28	476	May 4	1.05	97	Aug. 3	.26	12.1

Daily discharge, in second-feet, of Sycan River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25	24	49	45	.....	26	135	.....	42	17	16	11
2	24	25	46	42	.....	26	132	.....	41	17	15	11
3	24	25	27	38	.....	27	106	.....	39	16	13	12
4	24	26	49	35	.....	30	83	100	37	16	15	12
5	22	27	43	33	.....	28	86	.....	36	16	15	12
6	22	30	32	34	.....	24	83	.....	34	15	14	13
7	22	32	33	37	.....	31	79	.....	32	15	15	14
8	21	34	25	34	.....	31	74	.....	31	15	15	16
9	21	33	25	25	72	24	76	.....	29	14	14	19
10	21	32	25	19	56	26	100	.....	28	14	14	18
11	21	32	24	33	54	28	135	.....	27	14	15	18
12	.....	33	26	31	46	27	185	.....	26	14	14	18
13	.....	.....	25	25	29	26	215	.....	26	14	14	18
14	.....	.....	27	32	24	25	215	.....	25	14	12	19
15	.....	.....	34	30	28	29	178	.....	25	14	13	18
16	.....	.....	36	27	23	32	155	.....	24	14	13	18
17	.....	.....	42	29	20	37	135	86	22	14	12	18
18	.....	26	44	39	19	43	118	80	20	14	11	16
19	.....	25	43	28	18	64	110	75	20	14	11	16
20	.....	25	40	.....	18	83	110	70	19	14	10	16
21	.....	26	36	.....	17	172	128	64	19	14	10	16
22	.....	26	43	.....	19	362	165	62	19	14	10	16
23	23	26	40	.....	22	600	200	56	19	14	10	16
24	23	25	42	.....	19	640	230	51	18	15	10	16
25	23	26	44	.....	19	468	230	50	18	16	10	14
26	23	24	44	.....	19	398	215	51	17	16	10	14
27	22	.....	42	.....	22	275	.....	50	18	15	10	13
28	22	.....	43	.....	22	200	.....	49	17	15	10	14
29	20	.....	44	.....	.....	160	.....	49	17	14	10	19
30	22	.....	44	.....	.....	135	.....	48	18	14	10	18
31	23	.....	48	.....	.....	130	.....	43	.....	14	10	.....

NOTE.—Discharge estimated as follows: Oct. 12–22, 22 second-feet; Nov. 13–17, 30 second-feet; Nov. 27–30, 36 second-feet; Jan. 20 to Feb. 5, 30 second-feet; Feb. 5–8, 50 second-feet; April 27 to May 3, 145 second-feet; May 5–16, 93 second-feet.

Monthly discharge of Sycan River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	25	20	22.3	1,370
November	.....	24	29.2	1,740
December	49	24	37.6	2,310
January	45	19	31.5	1,940
February	72	17	30.9	1,720
March	640	24	136	8,360
April	230	74	142	8,450
May	.....	43	81.8	5,030
June	42	17	25.4	1,510
July	17	14	14.7	904
August	16	10	12.3	756
September	19	11	15.6	928
The year	640	10	48.3	35,000

LONG CREEK NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 4, T. 32 S., R. 13 E., 27 miles south of Silver Lake, Lake County, above point where creek begins to divide and spread over marsh.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13 to September 30, 1918.

GAGE.—Stevens continuous recorder on left bank of creek.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Stream bed crooked and deep. Vertical sod banks with scattered growth of willows. No defined control, beaver dams may occasionally cause backwater.

EXTREMES OF DISCHARGE.—Maximum stage during 1918, observed from high-water marks May 13, was about 2.0 feet (discharge about 62 second-feet). Minimum stage from recorder 0.48 foot, July 28–31, August 9–11, and September 28 (discharge, 9 second-feet).

ICE.—Stream freezes; no record during winter.

DIVERSIONS.—None above station; water is spread over meadows below station by numerous dams.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined. Operation of recorder satisfactory May 13–31 and June 8–26, and July 28–August 11, fairly satisfactory during part of September. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good as discharge is probably quite steady during gaps in record.

Discharge measurements of Long Creek near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 13	1.39	35.4
June 8	1.10	23.7
July 28	.48	9.0

Daily discharge, in second-feet, of Long Creek near Silver Lake, Oreg., for the period May 13 to Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1				9.3	10	16	35	16			168
2				9.3	9.8	17	32	16			
3				9.0	10	18	30	15			
4				9.2	10	19	30	14			
5				9.3	10	20	30	14			
6				9.3	11	21	29	14			
7				9.2	12	22	29	14		9.3	
8		24		9.0	19	23	30	15		9.5	
9		22		9.0	18	24	30	13		9.5	
10		22		9.0	15	25	29	13		9.6	
11		20		9.0	14	26	29	13		10	
12		19			13	27	27			10	
13	35	19			14	28	25		9.0		9.0
14	39	18				29	24		9.0		9.5
15	39	17				30	25		9.0		11
						31	25		9.0		

NOTE.—Discharge estimated June 1–7, 24 second-feet; June 27–30, 12 second-feet; July 1–27, 11 second-feet; Aug. 12–21, 9 second-feet; Aug. 28–31, 10 second-feet; Sept. 14–27, 12 second-feet.

Monthly discharge of Long Creek near Silver Lake, Oreg., for the period May 13 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13–31	39	25	30.1	1,130
June			17.8	1,060
July		9.0	10.7	658
August	10	9.0	9.31	572
September	19	9.0	12.1	720
The period				4,140

WHISKEY CREEK NEAR BEATTY, OREG.

LOCATION.—In sec. 19, T. 36 S., R. 12 E., at wagon bridge on road between Yainax and Beatty, 4 miles east of Yainax, Klamath County, and 2 miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27 to June 5, 1917, and March 23 to September 30, 1918; occasional gage readings during interval.

GAGE.—Vertical staff on main channel; Stevens 8-day recorder installed temporarily, used March 26 to May 5. Gage reader, A. S. Hotchkin.

DISCHARGE MEASUREMENTS.—Made from bridges.

CHANNEL AND CONTROL.—Stream bed of mud; brush along banks; fall in stream very slight; no defined control. Four channels at highest stages; one at low water. Conditions unfavorable. Stage-discharge relation affected by growth of aquatic plants during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.0 feet at 10 a. m., March 23 and 26 (discharge, 45 second-feet); minimum discharge recorded, 10 second-feet, June 19 to July 1 (gage height 1.13 to 1.18 second-feet, affected by growth of aquatic plants).

ICE.—Stage-discharge relation affected by backwater from ice during winter, but not during period covered by records.

DIVERSIONS.—Some bottom land above station irrigated by flooding.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent to middle of May; affected by growth of aquatic plants thereafter. Well-defined rating curve used March 23 to May 11; shifting control method used thereafter. Operation of recorder satisfactory; gage read about once a week to hundredths after May 5, when recorder was removed. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, or the daily gage reading. Records good.

Discharge measurements of Whiskey Creek near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 30	1.22	13.4	Apr. 12	1.33	18.2	June 19	1.13	9.6
Mar. 23	2.00	44.8	19	1.28	15.6	Aug. 8	1.33	12.1
30	1.63	26.0	May 5	1.05	12.7			
Apr. 2	1.43	16.9	21	1.15	12.5			

Daily discharge, in second-feet, of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		20	14	11	10		
2		18	13	11			
3		17	13			12	
4		17	12			12	
5		17	12		11		
6		17			11	12	
7		17				12	
8		17		11			12
9		21					
10		20		11		12	12
11		18	11			12	
12		17					
13		17			11		
14		17					12
15		16		11	11		
16		16		11			
17		16				12	
18		15	12			12	
19		15		10			
20		15			12		
21		14	12				12
22		14		10			
23	45	12				12	12
24	42	13				12	
25	44	12	12				
26	45	13		10			
27	36	13	12		12		
28	29	13					12
29	27	14		10			
30	25	14					
31	23					12	

Monthly discharge of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 23–31	45	23	35.1	627
April	21	12	15.8	940
May	14	11	12.3	756
June	11	10	10.6	631
July	12	10	11.1	682
August	12	12	12.0	738
September	12	12	12.0	714
The period				5,090

MODOC POINT CANAL NEAR CHILOQUIN, OREG.

LOCATION.—In SE. ¼ sec. 3, T. 35 S., R. 7 E., at intake 1 mile south of Chiloquin, Klamath County.

RECORDS AVAILABLE.—June 14, 1915, to September 30, 1918.

GAGE.—Inclined staff on left of concrete-lined section, about 100 feet below head gates; installed June 29, 1915; previous to that date readings were made on gage at bridge, one-half mile below. Gage reader, F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section of canal begins immediately below gage; bottom width, 10 feet; grade, 2.64 feet per mile. Control is cobblestone apron several hundred feet below gage, placed in March, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.62 feet July 10 (discharge, 52 second-feet). Canal dry at times. 95 second-feet was diverted July 10, 1915, but most of it turned back into river at first wasteway.

ACCURACY.—Stage-discharge relation practically permanent during season. Rating curve well defined. Gage read to quarter-tenths once a day. Daily discharge ascertained by applying gage readings to rating table. Records good for May to August; roughly approximate for rest of season.

Discharge measurements of Modoc Point canal near Chiloquin, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 5	0.65	3.2	June 5	1.98	23.5
Apr. 23	1.00	5.0	Aug. 1	2.40	39.7
May 6	1.43	11.7			

Daily discharge, in second-feet, of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1		6	21	9	40	16		11	23	40	24
2		6	24	13	40	17		11	23	40	40
3		10	24	22	40	18		13	23	40	40
4		10	21	22	40	19		13	23	40	40
5		10	23	22	40	20		13	23	40	40
6		11	22	22	40	21		13	23	40	40
7		11	22	22	40	22		13	18	40	40
8		11	22	21	40	23	5	13	3	40	40
9		11	22	23	40	24	6	13	3	40	40
10		11	22	44	40	25	6	13		40	40
11		11	23	39	40	26	5	16		40	40
12		11	23	39	26	27	5	16	3	40	40
13		11	23	40	24	28	5	16	3	40	
14		11	23	40	24	29	5	16	3	40	
15		11	23	40	24	30	4	17	3	40	
						31		19		40	

NOTE.—Mean discharge estimated as follows: Oct. 1 to Nov. 10, 3 second-feet; Mar. 8 to Apr. 22, 5 second-feet; Aug. 28–31, 35 second-feet. Canal dry Nov. 6 to Mar. 7.

Monthly discharge of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			a 3.0	184
November 1–10			a 3.0	60
March (24 days)			a 5.0	238
April			5.0	298
May	19	6	12.2	750
June (23 days)	24	3	18.3	1,020
July	44	9	34.1	2,100
August	40	24	36.8	2,260
September			a 21.0	1,250
The period				8,160

a Estimated.

WOOD RIVER AT FORT KLAMATH, OREG.

LOCATION.—In sec. 22, T. 33 S., R. 7½ E., at highway bridge one-fourth mile east of Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1911, to September 30, 1918.

GAGE.—Vertical staff attached to bridge; read daily by Mrs. E. A. Page

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Clean gravel overlain with pumice sand, dunes of which may at times be observed moving downstream; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.5 feet February 6 (discharge can not be computed on account of backwater from logs); minimum stage recorded, 0.90 foot September 12 (discharge, 170 second-feet).

1911 and 1913–1918: Maximum open-water stage recorded, 2.50 feet July 24, 1913 (discharge, 495 second-feet, somewhat uncertain). The lowest discharge is that of 1918.

ICE.—Stage-discharge relation unaffected by ice, as most of the water comes from copious springs a few miles above.

DIVERSIONS.—Considerable water is diverted above station for watering hay lands, mostly in May and June.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unstable on account of log jams. Fairly well-defined rating curve used April 1–23 and July 23 to September 30; daily discharge ascertained by method shifting of control October 1–23, April 24 to July 22; discharge October 24 to March 31 not computed. Gage read once daily to half-tenths; readings appear reliable. Records for October and April to September, good.

COOPERATION.—Gage-height records and part of discharge measurements furnished by United States Reclamation Service.

Discharge measurements of Wood River at Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	R. C. Briggs	1.35	244	May 22	H. W. Humphrey	1.66	208
Apr. 4	Briggs and Humphrey	1.36	278	28	R. C. Briggs	1.60	206
19	H. W. Humphrey	1.40	293	June 22	do	1.00	212
May 4	do	1.18	257	Aug. 8	do	1.00	184

Daily discharge, in second-feet, of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May	June.	July.	Aug.	Sept.
1	214	292	265	207	202	202	191
2	224	292	265	207	202	202	191
3	224	292	252	207	191	214	191
4	224	287	257	207	191	202	191
5	234	292	252	207	191	202	191
6	244	292	238	207	191	202	180
7	244	292	238	207	191	191	180
8	234	292	238	207	191	191	191
9	234	292	238	207	191	191	202
10	224	292	238	207	191	180	191
11	224	292	226	207	191	180	180
12	224	296	226	219	191	180	170
13	224	292	226	243	191	180	191
14	224	292	226	257	191	180	202
15	224	278	226	257	180	180	202
16	234	278	226	243	176	191	202
17	234	278	226	231	176	191	214
18	234	278	214	207	176	191	214
19	244	287	214	207	176	191	226
20	234	278	202	207	176	214	226
21	234	278	202	207	176	214	214
22	234	278	205	207	187	226	214
23	234	265	214	207	191	226	226
24	.....	265	214	207	191	226	226
25	.....	252	214	207	191	214	226
26	.....	252	214	202	191	214	226
27	.....	252	214	202	191	214	238
28	.....	265	207	191	191	214	238
29	.....	265	207	191	191	202	214
30	.....	265	207	191	191	191	214
31	.....	.....	207	.....	202	191	.....

Monthly discharge of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-23	244	214	231	10,500
April	292	252	280	16,700
May	265	207	226	13,900
June	257	191	212	12,600
July	202	176	189	11,600
August	226	180	199	12,200
September	238	170	205	12,200

"A" CANAL AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 29, T. 38 S., R. 9 E., at head of tunnel one-fourth mile below head gates of canal and 1 mile northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—Irrigation season, 1911 to 1918. Some water was diverted for three or four years prior to 1911, but no record was kept.

GAGE.—Stevens 8-day water-stage recorder on right of canal just above weir. Barrett & Lawrence recorder used prior to 1917.

DISCHARGE MEASUREMENTS.—Made from a foot plank just inside lower end of tunnel, about half a mile below gage; rectangular section, 13.5 feet wide.

CHANNEL AND CONTROL.—Trapezoidal weir, 18.15 feet long, with its crest 7.27 feet above bcttom of canal, which is a concrete-lined section 13.5 feet wide on the bottom, 12 feet deep, and with side slopes ½ to 1. Canal has become partly filled with débris which has fallen in from the sides.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.54 feet at 8 p. m. June 15 (discharge, 479 second-feet).

1911–1918: Maximum stage that of 1918. Minimum discharge, zero.

ACCURACY.—Stage discharge relation unstable. Discharge for given gage height increasing from year to year as velocity of approach becomes greater, due to filling up of canal above weir. Rating curve for 1918 based upon rating curve for 1916, and discharge measurements made after September 30, 1918. Operation of water-stage recorder satisfactory except September 19–24. Records considered good.

COOPERATION.—Data furnished by United States Reclamation Service.

"A" canal diverts water from Link River immediately below outlet of Upper Klamath Lake in NE. ¼ sec. 30, T. 38 S., R. 9 E., for irrigating lands east of Klamath River on both sides of Lost River. Most of the return waters reach Lost River.

Daily discharge, in second-feet, of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug	Sept.
1	.....	106	204	319	273	143	16	18	368	400	264	273	58
2	.....	143	188	291	400	147	17	21	368	338	255	196	58
3	.....	162	220	229	411	137	18	21	338	422	229	147	58
4	.....	246	238	212	411	119	19	21	310	433	282	137	55
5	.....	300	238	212	400	102	20	21	282	411	273	137	53
6	.....	300	238	212	390	98	21	26	319	422	273	127	51
7	.....	310	300	220	390	97	22	44	358	422	291	127	49
8	.....	338	338	246	379	93	23	56	379	422	319	127	47
9	.....	422	368	246	358	85	24	63	390	379	348	127	45
10	.....	411	400	246	319	78	25	75	400	400	358	127	43
11	.....	390	422	246	291	78	26	81	358	379	368	127	39
12	.....	390	422	246	246	76	27	89	310	379	368	127	39
13	.....	379	433	229	264	67	28	88	255	379	368	145	21
14	.....	368	433	246	264	59	29	79	238	358	368	145	12
15	8	379	444	255	264	58	30	96	238	338	379	141	24
							31	.....	212	.....	400	137	.....

NOTE.—Canal dry Oct 1 to Apr. 14. Daily discharge interpolated Sept. 19–24.

Monthly discharge of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
April 15-30	96	8	50.4	1,600
May	422	106	315	19,400
June	444	188	359	21,400
July	400	212	284	17,500
August	411	127	239	14,700
September	147	12	69.6	4,140
The year				78,700

LOST RIVER AT WILSON BRIDGE, NEAR OLENE, OREG.

LOCATION.—On line between secs. 29 and 30, T. 39 S., R. 10 E., at Wilson Bridge, one-fourth mile below diversions dam and 4 miles by river below Olene, Klamath County.

RECORDS AVAILABLE.—March 14, 1912, to September 30, 1918.

DRAINAGE AREA.—Not measured.

GAGE.—Gurley 7-day recorder, referred to vertical staff fastened to highway bridge. Zero of gage, 4,005.01 feet above sea level or 0.17 foot lower than previous datum. Gage read by watchman for dam.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Gravel and chalk rock; clean and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 65.20 feet at 7 p. m. March 21 (discharge, 696 second-feet); minimum discharge estimated as 6 second-feet (leakage through flashboards) October 1 to March 18 and April 4 to September 30.

1904–1918: Maximum stage recorded, 18.25 feet, mean for February 7, 1907, at Merrill station (discharge, 9,200 second-feet). The maximum stage for Olene station was 13.5 feet early in 1904, determined from high-water marks by John H. Lewis, May 24, 1904 (discharge, from partly developed rating curve, 8,600 second-feet). Minimum stage recorded for natural flow conditions, 4.29 feet June 19, 1911, at Olene (discharge, 58 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—This station is just below the dam at which practically all the discharge of Lost River up to about 500 second-feet is diverted through the diversion canal into Klamath River or into the G canal on the east bank of the river.

REGULATION.—Considerable pondage at dam.

ACCURACY.—Stage-discharge relation practically permanent during run-off period; rating curve well defined. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Lost River at Wilson Bridge near Olene, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 23	63.94	470	Mar. 29	63.12	376	Apr. 2	61.10	149
25	64.46	567	30	62.05	258	3	60.62	113
27	65.01	658	Apr. 2	61.62	197			

Daily discharge, in second-feet, of Lost River at Wilson Bridge near Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1		232	11			21	652	
2		149	12			22	609	
3		88	13			23	496	
4			14			24	511	
5			15			25	567	
6			16			26	519	
7			17			27	634	
8			18	0		28	511	
9			19	40		29	384	
10			20	364		30	296	
						31	278	

NOTE.—Discharge estimated 6 second-feet; Oct. 1 to Mar. 18; Apr. 4 to Sept. 30.

Combined daily discharge, in second-feet, of Lost River, Lost River diversion canal, and G canal, less Olene wasteway, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	96	91	102	134	158	142	535	95	86	110	108	100
2	95	87	106	132	153	142	446	98	97	119	85	99
3	94	83	108	137	147	147	383	113	109	122	81	92
4	94	83	107	135	139	155	300	88	110	121	87	90
5	94	84	106	135	139	175	294	93	93	122	95	90
6	91	84	104	134	141	204	284	88	78	119	102	92
7	93	85	105	134	147	214	274	101	71	113	111	90
8	91	85	105	134	153	221	266	97	55	87	110	89
9	93	85	106	134	188	216	268	95	80	56	106	.....
10	94	87	109	138	220	218	261	78	78	59	102	.....
11	94	90	112	135	216	218	259	65	65	73	101	.....
12	94	92	112	139	206	224	255	89	77	53	99	.....
13	94	92	112	.....	212	232	255	109	84	42	81	.....
14	94	90	112	.....	212	224	245	108	83	51	58	.....
15	94	89	119	.....	210	220	234	86	99	30	62	.....
16	89	89	121	.....	180	212	219	62	97	29	77	.....
17	88	89	124	.....	157	202	206	58	96	27	72	.....
18	90	92	123	.....	151	208	192	44	106	53	73	.....
19	92	92	122	161	142	279	180	52	123	53	72	.....
20	93	92	122	207	137	625	171	64	130	56	74	.....
21	.....	92	122	284	132	933	175	57	131	66	74	.....
22	.....	92	122	290	134	890	171	42	121	78	70	.....
23	.....	92	122	261	133	777	86	47	115	79	76	.....
24	.....	92	122	237	139	800	54	63	117	82	76	.....
25	.....	93	123	222	138	861	62	83	116	101	80	.....
26	.....	93	124	208	141	811	70	77	103	104	94	.....
27	.....	92	126	193	141	933	74	74	93	108	95	.....
28	90	93	127	184	145	808	78	96	26	109	101	.....
29	93	94	127	180	.....	673	81	91	75	116	100	.....
30	93	96	127	173	.....	585	84	92	138	116	101	.....
31	95	.....	129	168	.....	572	.....	96	.....	112	100	.....

NOTE.—Discharge for last part of September discarded; there was probably some flow through the diversion canal of which no record was kept. Discharge estimated: Oct. 21–27, 92 second-feet; Jan. 13–18, 150 second-feet.

Monthly discharge of Lost River at Wilson Bridge, near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			a 6.0	369
November			a 6.0	357
December			a 6.0	369
January			a 6.0	369
February			a 6.0	333
March	652	6	193	11,900
April	232	6	21.0	1,250
May			a 6.0	369
June			a 6.0	357
July			a 6.0	369
August			a 6.0	369
September			a 6.0	357
The year	652		23.1	16,800

a Estimated.

Combined monthly discharge of Lost River, Lost River diversion canal, and G canal, less Olene wasteway, near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	96	88	92.6	5,690
November	96	83	89.7	5,340
December	129	102	116	7,130
January	290	132	171	10,500
February	220	132	161	8,940
March	933	142	423	26,000
April	535	54	216	12,900
May	113	42	80.7	4,960
June	133	26	95.1	5,660
July	122	27	82.8	5,090
August	111	58	87.8	5,400
September	100		a 85.0	5,060
The year	933	26	142	103,000

a Estimated.

TULE LAKE NEAR MERRILL, OREG.

LOCATION.—At Bloody Point, on east shore of lake, in SW. ¼ sec. 36, T. 48 N., R. 5 E., Calif.; formerly in sec. 8, T. 41 S., R. 11 E., at boat landing on J. F. Adams's ranch, half a mile south of ranch building and 3 miles east of Merrill, Klamath County.

RECORDS AVAILABLE.—May 17, 1904, to September 30, 1918.

GAGE.—Vertical staff at end of D canal of Klamath project, 7 miles below Malin, Oreg., used beginning June 27. Former gage was vertical staff on pile driven in bed of Lost River at a point which was formerly close to its mouth but is now nearly 2 miles from the open lake. Datum of new gage 4041.83 feet above sea level; of gage used September 22, 1916, to June 11, 1918, 4,043.93 feet above sea level; all readings reduced to a datum 4,000 feet above sea level. Several earlier gages used prior to 1916; readings beginning October 1, 1912, refer to sea-level datum; earlier readings subject to some uncertainty of datum. Gage readers, employees of United States Reclamation Service.

EXTREMES OF STAGE.—Maximum stage recorded during year 4,045.0 feet October 10; Minimum stage recorded, 4,042.38 feet, September 27, 1918.

1904–1918: Maximum stage recorded, 11.35 feet April 30 and May 1, 1907, or 4,059.91 feet above sea level. Minimum stage recorded is that of 1918.

DIVERSIONS AND REGULATIONS.—No water has reached mouth of Lost River from drainage area above Clear Lake dam since June, 1909; since May 1, 1912, most of the discharge of Lost River up to 400 or 500 feet second-feet has been diverted at Lost River dam into Klamath River or through the G canal for irrigation.

COOPERATION.—Records furnished by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		44.80						44.60	44.30			
2					44.84	44.75						
3								44.57				
4												
5				40.81					44.32			
6											43.03	
7			44.80									42.58
8							44.80					
9										43.65		
10								44.55				
11	45.00							44.52	44.26			
12							44.75					
13												
14												
15						44.75	44.73			43.48		
16								44.44				
17												
18		44.80					44.75					42.48
19												
20	44.28					44.85	44.75					
21			44.80									
22				44.84			44.70			43.31	42.73	
23								44.34				
24		44.76			44.84							
25												
26												
27	44.76								43.78			42.38
28			44.88	44.82	44.75							
29								44.36			42.63	
30												
31										43.28		

MILLER CREEK NEAR LORELLA, OREG.

LOCATION.—In sec. 7, T. 40 S., R. 14 E., at site of old wagon bridge three-fourths mile above highway bridge, 1 mile east of Swingle ranch in Langell Valley, and 3 miles south of Lorella, Klamath County.

DRAINAGE AREA.—270 square miles.

RECORDS AVAILABLE.—April 1, 1909, to September 30, 1918; August 10, 1904, to December, 1908, for a station in sec. 12, T. 39 S., R. 13 E., at the lower end of Horsefly Valley and 10 miles or more by creek above the present station. Only a small amount of inflow between the two points.

GAGE.—Friez water-stage recorder on right bank installed January 3, 1918, replacing temporary installation used since April 25, 1917, when old installation on bridge abutment on left bank was washed out. Gage inspected by H. E. Winnard, jr.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading at low water; current is sluggish at the bridge, as the gradient of the stream is flat.

CHANNEL AND CONTROL.—Stream bed composed of rocks and gravel, overlain with some silt; control fairly permanent; left bank subject to overflow in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.20 feet at 4 a. m. March 26 (discharge, 1,490 second-feet); minimum stage not recorded; stream practically dry.

1904–1918: Maximum stage recorded, 14.0 feet February 5, 1907 (discharge, 6,730 second-feet).

ICE.—Stage-discharge relation apparently not materially affected by ice, as control remains open.

DIVERSIONS.—A small irrigating flume, carrying about 1 second-foot, diverts water above the station.

REGULATION.—Flow may be occasionally affected by a rock-and-brush diversion dam just above gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve changed slightly below 17 second-feet to conform to 1918 measurement and is well defined. Operation of water-stage recorder fairly satisfactory except January 5–12, when float well was frozen and January 13–15, 20–21, April 1–5 and 15–19, when no record was secured. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

COOPERATION.—Field data furnished by United States Reclamation Service, Klamath project.

The following measurement was made by H. W. Humphrey:
April 24: Gage height, 3.06 feet, discharge, 3.9 second-feet.

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.
1	20	9.2	4.6	18	.....	16	5.0	306	14	152	.....
2	34	8.0	4.8	64	.....	17	5.6	270	8.4	367	.....
3	16	8.0	7.7	267	.....	18	5.0	202	6.5	582	.....
4	8.0	4.4	8.0	164	.....	19	5.6	228	5.0	640	.....
5	7.1	5.0	10	152	.....	20	5.6	162	3.6	561	12
6	6.2	.....	57	164	53	21	6.2	98	3.8	604	10
7	5.0	.....	410	152	56	22	7.1	34	4.2	626	8.0
8	4.4	.....	157	197	56	23	8.0	26	5.0	940	6.5
9	4.4	.....	92	81	72	24	11	22	7.4	964	4.6
10	3.8	.....	114	102	157	25	22	26	9.2	1,060	4.0
11	3.6	.....	114	81	76	26	20	18	10	1,060	4.8
12	2.7	6.5	44	87	44	27	17	17	13	604	4.8
13	2.7	.....	44	127	29	28	17	16	16	582	4.2
14	3.0	.....	36	182	29	29	17	16	.....	448	3.8
15	3.0	.....	17	190	.....	30	12	7.1	.....	462	3.0
						31	11	4.2	.....	462	.....

NOTE.—Mean discharge estimated as follows: Jan. 6–11, 6 second-feet; Jan. 13–15, 150 second-feet; Apr. 1–5, 250 second-feet; Apr. 15–19, 20 second-feet. Creek practically dry during October, November, and June to September.

Monthly discharge of Miller Creek near Lorella, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	34	2.7	9.65	593
January	306	4.2	63.9	3,930
February	410	3.6	43.8	2,430
March	1,060	18	390	24,000
April		3.0	66.3	3,950
May			a1.5	92
The period				35,000

a Estimated.

NOTE.—Creek bed practically dry during October, November, and June to September.

OLENE WASTEWAY AT OLENE, OREG.

LOCATION.—In SW. ¼ sec. 14, T. 39 S., R. 10 E., at flume on F canal of Klamath project that crosses Lost River at Olene, Klamath County, about 4 miles upstream, from Lost River dam.

RECORDS AVAILABLE.—Irrigation seasons, 1915 to 1918.

GAGE.—Records are kept of width of gate opening and of head of water on the orifice.

DISCHARGE MEASUREMENTS.—Made in flume above and below wasteway, and difference between the two measurements taken as outflow from wasteway.

ACCURACY.—Coefficient of discharge fairly well determined for discharge of 12 to 20 second-feet; somewhat uncertain outside of these limits. Gage and gate opening record to half-tenth once a day. Records for total yearly run-off fair.

COOPERATION.—Records furnished by United States Reclamation Service.

No current-meter measurements were made during the year.

The Olene wasteway is used to supply water from Link River to supplement the flow of Lost River when the latter is insufficient to supply the G canal. The records are used in obtaining the total natural flow of Lost River.

Daily discharge, in second-feet, of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	.....	36	28	10	16	75	27	81	.....
2	.....	22	28	19	17	75	27	81	.....
3	.....	7	28	28	18	75	26	68	.....
4	30	7	28	30	19	75	20	67	.....
5	28	27	28	30	20	75	14	68	.....
6	35	38	28	27	21	80	14	64	.....
7	32	52	28	12	22	75	19	50	5
8	34	70	38	12	23	75	25	51	.....
9	36	51	62	17	24	75	25	52	.....
10	55	51	81	23	25	50	26	36	.....
11	75	52	58	25	26	50	34	31	.....
12	56	43	60	21	27	50	43	24	.....
13	36	43	81	30	28	15	43	25	.....
14	36	43	60	45	29	15	68	23	.....
15	56	26	81	26	30	26	.....	24	.....
					31	26	.....	24	.....

NOTE.—Wasteway dry Oct. 1 to May 3, June 30, Aug. 16 to 21, and Aug. 23 to Sept. 30.

Monthly discharge of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May, 28 days	80	15	50.8	2,820
June, 29 days	68	7	33.8	1,940
July	81	23	48.5	2,980
August, 16 days	45	5	22.5	714
The year				8,450

LOST RIVER DIVERSION CANAL NEAR KLAMATH FALLS, OREG.

LOCATION.—At corner of secs. 25 and 36, T. 39 S., R. 9 E., and secs. 30 and 31, T. 39 S., R. 10 E., at wagon bridge 10 miles southeast of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1918.

GAGE.—Two Gurley 7-day recorders. No. 1 installed at wagon bridge at station 85; No. 2 at a wagon bridge at station 330, or about 5 miles below No. 1. Gage readings have been recorded to same datum, which is 4,080 feet above sea level. Gage readers, United States Reclamation Service employees. Gages above and below the intake gates at the Lost River dam,[1] in SW. ¼ sec. 29, T. 39 S., R. 10 E., were read up to March 31, 1916, and openings of the three gates recorded.

DISCHARGE MEASUREMENTS.—Made from a footbridge near southeast corner of sec. 30, about a mile above gage No. 1, and about half a mile below intake of canal.

CHANNEL AND CONTROL.—Artificial canal having a normal section about 50 feet wide on bottom, with side slopes 2 to 1, slope 0.00008, and designed to carry 4 to 5 feet depth of water. Klamath River backs water normally up to head of canal.

EXTREMES OF DISCHARGE.—Maximum stage at gage No. 2 from water-stage recorder, 7.40 feet April 1 to 3; maximum discharge during year, 303 second-feet April 11, fall 1.12 feet).

1912–1918: Maximum discharge recorded, 508 second-feet February 28, 1914, for openings of 5.5 feet on all three gates and a head of 0.85 foot. Canal dry at times.

ICE.—Stage-discharge relation unaffected by ice.

ACCURACY.—Stage-discharge relation unstable, being influenced by backwater from Klamath River. Daily discharge ascertained according to the method outlined in Water-Supply Paper 345–E.[2] Normal rating curve fairly well defined for gage No. 2 from which stages have been used in making computations, gage No. 1 being used to obtain slopes. Operation of recorders satisfactory except at gage No. 1, March 18–22, and at gage No. 2, October 21–27, November 21–23, and January 13–18 and possibly at other times when operation of float may have been hampered by ice for short periods. Records fair.

COOPERATION.—Field data furnished by United States Reclamation Service.

Lost River diversion canal diverts water from Lost River into Klamath River to assist in lowering Tule Lake for the purpose of reclaiming the lake bed.

[1] This station has been referred to as "Lost River diversion canal near Olene."

[2] Hall, M. R., Hall, W. E., and Pierce, C. H., A method of determining the daily discharge of rivers of variable slope: U. S. Geol. Survey Water-Supply Paper 345, pp. 53–65, 1915.

Discharge measurements of Lost River diversion canal near Klamath Falls, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.		Discharge.
	Gage No. 1.	Gage No. 2.	
	Feet.	*Feet.*	*Sec.-ft.*
Dec. 15	7.12	6.12	115
Apr. 18	7.50	6.80	175

Daily discharge, in second-feet, of Lost River diversion canal near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	90	85	96	128	152	136	303
2	89	81	100	126	147	136	297
3	88	77	102	131	141	141	295
4	88	77	101	129	133	149	300
5	88	78	100	129	133	169	288
6	85	78	98	128	135	198	278
7	87	79	99	128	141	208	268
8	85	79	99	128	147	215	260
9	87	79	100	128	182	210	262
10	88	81	103	132	214	212	255
11	88	84	106	129	210	212	253
12	88	86	106	133	202	218	249
13	88	86	106	.....	206	226	249
14	88	84	106	.....	206	218	239
15	88	83	113	.....	204	214	221
16	83	83	115	.....	174	206	197
17	82	83	118	.....	151	196	185
18	84	86	117	.....	145	202	171
19	86	86	116	155	136	239	160
20	87	86	116	201	131	261	151
21	.....	86	116	278	126	281	155
22	.....	86	116	284	128	281	147
23	.....	86	116	255	127	281	53
24	.....	86	116	231	133	289	0
25	.....	87	117	216	132	294	.....
26	.....	87	118	202	135	292	.....
27	.....	86	120	187	135	299	.....
28	84	87	121	178	139	297	.....
29	87	88	121	174	.....	289	.....
30	87	90	121	167	.....	289	.....
31	89	.....	123	162	.....	294	.....

NOTE.—Mean discharge estimated as follows: Oct. 21–27, 86 second-feet; Jan. 13–18, 144 second-feet.

Monthly discharge of Lost River diversion canal near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	90	82	86.6	5,320
November	90	77	83.7	4,980
December	123	96	110	6,760
January	284	126	165	10,100
February	214	126	155	8,610
March	299	136	231	14,200
April 1–23	303	53	228	10,400
The period	.....	.....	.....	60,400

G CANAL NEAR OLENE, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 39 S., R. 10 E., at intake at east end of Lost River dam, 4 miles south of Olene, Klamath County.

RECORDS AVAILABLE.—Irrigating seasons, 1912 to 1918.

GAGE.—Stevens 8-day water-stage recorder 200 feet below the intake (referred to as gage No. 1 in 1916).

DISCHARGE MEASUREMENTS.—Made from wagon bridge 1,500 feet below intake.

CHANNEL AND CONTROL.—Canal is of regular section, 16 feet wide on the bottom and practically permanent. No defined control; timber check at station 112 was not operated in 1917 or 1918 to any considerable extent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during irrigating season, April 15 to September 30, 144 second-feet July 2 (gage height, 4.32 feet). Minimum stage recorded, 0.20 foot April 15 (discharge, 7 second-feet). Canal dry at times.

1912–1918, maximum discharge, that of 1918.

ACCURACY.—Stage-discharge relation unstable on account of growth of aquatic plants. Operation of recorder satisfactory except May 31 to June 7, when daily readings on staff gage were used. Rating curve for unobstructed channel well defined and applied April 15 to May 21; shifting-control method used thereafter; correction curve fairly well defined. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

COOPERATION.—Field data and computations by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

G canal diverts water from Lost River in SW. ¼ sec. 29, T. 39 S., R. 10 E., and irrigates land east of the lower part of the river and north of Tule Lake. Return waters reach both the river and the lake.

Discharge measurements of G canal near Olene, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 22	0.75	18.3	June 20	4.04	134	Aug. 7	4.23	118
May 1	2.58	95	26	4.23	133	21	3.36	66
10	3.10	128	July 13	3.77	116	Sept. 30	2.31	23.7
21	3.17	132	25	4.20	131			
June 8	3.49	122	30	4.33	133			

Daily discharge, in second-feet, of G canal near Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day	Apr	May	June.	July	Aug.	Sept.
1		89	116	132	112	94	16	16	131	118	104	71	40
2		92	113	141	98	93	17	15	127	117	102	66	35
3		107	110	144	103	86	18	15	113	126	115	67	30
4		112	111	143	111	84	19	14	121	137	114	66	39
5		115	114	144	119	84	20	14	133	138	118	68	40
6		117	110	141	123	86	21	14	131	139	124	68	42
7		127	117	135	117	84	22	18	111	134	122	69	43
8		125	119	119	116	83	23	27	116	134	124	70	41
9		125	125	112	117	64	24	48	132	136	128	70	29
10		127	123	134	119	54	25	56	127	136	131	74	29
11		134	111	125	120	53	26	64	121	131	129	88	29
12		139	114	116	114	52	27	68	118	130	126	89	28
13		139	121	117	105	51	28	72	105	63	128	95	27
14		138	120	114	97	50	29	75	100	137	133	94	28
15	7	136	119	105	82	45	30	78	112	132	134	95	24
							31		116		130	94	

Monthly discharge of G canal near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April (16 days)	78	7	37.6	1,190
May	139	89	121	7,440
June	139	63	122	7,260
July	144	102	125	7,690
August	123	66	93.5	5,750
September	94	24	52.2	3,110
The period				32,400

LOWER KLAMATH LAKE NEAR MOUNT DOME, CALIF.

LOCATION.—In sec. 35, T. 47 N., R. 2 E., at Lairds landing, at extreme south end of Lower Klamath Lake, about 6 miles southeast of Brownell, Siskiyou County

RECORDS AVAILABLE.—January 23, 1907, to July 15, 1909; August 1, 1917, to August 12, 1918, when station was discontinued.

GAGE.—Vertical staff on northeast bent of wharf; datum, 4,083.18 feet above sea level; temporary gage during July, 1918; August 1, 1912, to August 14, 1915, datum 4,085 feet. Gage reader, Lawrence Laird. Gage used 1907 to 1909, in sec. 35; datum, 4,082.50 feet above sea level.

EXTREMES OF STAGE.—1907–1909 and 1912–1918: Maximum stage recorded, 2.4 feet, or 4,087.4 feet above sea level, April 28–29, 1914. Minimum stage recorded, 4,082.8 feet by levels October 2, 1918.

COOPERATION.—Record furnished by United States Reclamation Service, Klamath project.

Daily gage height, in feet, of Lower Klamath Lake near Mount Dome, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	.....	.....
2	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	84.0	.....
3	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	84.0	.....
4	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.9	84.6	84.0	.....
5	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.8	84.6	84.0	.....
6	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.8	84.6	84.0	.....
7	84.9	84.9	84.9	85.1	.....	85.1	.....	84.8	84.6	.....	.....
8	84.9	84.9	84.9	85.1	.....	85.1	.....	84.8	84.6	.....	.....
9	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.8	84.5	.....	.....
10	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
11	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
12	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	83.3
13	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
14	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	83.7	.....
15	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	84.5	83.7	.....
16	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
17	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
18	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
19	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.7	.....	.....	.....
20	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.7	.....	.....	.....
21	84.9	84.8	84.9	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
22	84.9	84.8	84.9	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
23	84.9	84.8	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
24	84.9	84.8	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
25	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
26	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6			
27	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
28	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
29	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
30	84.9	84.9	85.0	85.1	.....	85.1	84.9	84.6	.....	.....	.....
31	84.9	.....	85.0	85.1	.....	85.1	.....	84.6	.....	.....	.....

BEAVER CREEK NEAR LILYGLEN, OREG.

LOCATION.—In SW. ¼ sec. 32, T. 38 S., R. 4 E., one-eighth mile above Klum Creek, 6 miles southeast of former post office of Lilyglen and 22 miles east of Ashland, Jackson County

DRAINAGE AREA.—About 22 squre miles (measured on maps of United States Reclamation Service).

RECORDS AVAILABLE.—April 23 to June 14, 1916; October 21, 1916, to July 5, 1917; and February 1 to May 31, 1918.

GAGE.—Stevens 8-day recorder on left bank at same site as vertical staff used in 1916; datum 2.0 feet higher. Gage reader, Wm. Lindsay.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Stream bed of silt and clay; current sluggish; probably will not shift materially.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.68 feet at 8 p. m. February 6 (discharge, 132 second-feet). Stream bed dry in summer.

ICE.—Stage-discharge relation affected by ice February 14 to March 4. Discharge estimated.

DIVERSIONS.—A little water is diverted above the station for irrigating meadows and watering stock.

ACCURACY.—Stage-discharge relation practically permanent, rating curve well defined. Operation of recorder satisfactory except during part of February, when water in float well may have been frozen. Daily discharge ascertained by applying to rating table the mean gage height obtained by inspecting the recorder graph. Records good except those for ice period, which are poor.

Discharge measurements of Beaver Creek near Lilyglen, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 1	J. B. Platt [a]	1.08	20.2
Apr. 6	C. Z. Boyden [a]	1.10	35.5
6	....do....	1.08	35.2

[a] Engineers of Medford Irrigation District.

Daily discharge, in second-feet, of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1	7	.....	62	12	16	.....	30	31	9
2	7	.....	53	12	17	.....	30	30	8
3	10	.....	46	12	18	.....	43	24	7
4	13	.....	43	10	19	.....	46	20	6
5	29	.....	38	11	20	.....	53	20	5
6	88	.....	35	10	21	.....	50	20	4
7	26	.....	31	9	22	.....	57	20	4
8	26	22	33	8	23	.....	54	18	4
9	26	20	47	14	24	.....	52	18	2
10	18	18	40	15	25	.....	64	17	2
11	17	16	34	10	26	.....	62	16	4
12	12	16	35	9	27	.....	60	14	8
13	10	18	45	8	28	.....	55	14	6
14	10	20	40	8	29	.....	54	13	4
15	10	22	35	9	30	.....	62	13	3
					31	.....	64	.....	2

NOTE.—Mean discharge estimated as 15 second-feet Feb. 16-28, and 20 second-feet Mar. 1-7.

Monthly discharge of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	88	.....	18.0	1,000
March	64	.....	36.4	2,240
April	62	13	30.2	1,800
May	15	2	7.6	467
The period	.....	.....	.....	5,510

NOTE.—Total run-off not recorded; estimated as 2,000 acre-feet.

KEENE CREEK AT HYATT PRAIRIE, NEAR ASHLAND, OREG.

LOCATION.—In SW. ¼ sec. 16, T. 39 S., R. 3 E., near proposed dam site at Hyatt Prairie, 3 miles north of Green Spring Mountain road from Ashland to Klamath Falls and 20 miles from Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1917, to June 2, 1918; miscellaneous measurements in 1916.

GAGE.—Stevens Type A recorder on right bank 100 feet above proposed dam site. Inspected by engineers of Talent Irrigation District.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge near gage.

CHANNEL AND CONTROL.—Stream bed sand and clay, may shift in extreme floods; control of rocks and boulders, practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 3.65 feet at 2 a. m. January 12 (discharge, 186 second-feet). Creek channel practically dry at times during the summer, and early fall.

1917–1918: Maximum stage from water stage recorder 4.08 feet, Apr. 25, 1917, (discharge, 194 second-feet).

ICE.—Stage-discharge relation apparently affected by ice from about January 15 to 22, probably little if at all at other times.

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of recorder satisfactory except December 5-13, when paper slipped. Daily discharge ascertained by applying to rating table the mean gage heights obtained by inspecting the recorder graph, or in case of days of considerable fluctuation, by subdividing days. Records good.

Discharge measurements of Keene Creek at Hyatt Prairie, near Ashland, Creg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	Dillard and Cooper [a]	1.40	6.08	Apr. 27	F. C. Dillard [a]	1.65	15.8
Mar. 29	.....do	2.54	52.9	June 2	.....do	.44	1.0

[a] Engineers of Talent Irrigation District.

Daily discharge, in second-feet, of Keene Creek at Hyatt Prairie, near Ashland, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5.0	1.8	0.9	8.2	36	9.0	0.4
2	3.2	1.6	2.2	9.8	26	8.4	.2
3	1.1	2.1	4.8	8.0	22	7.8	.....
4	.8	4.6	4.9	6.1	21	7.6	.....
5	.8	2.8	6.6	5.5	21	8.2	.....
6	.....	3.7	35	5.2	21	6.8	.....
7	.....	5.2	11	5.0	21	6.2	.....
8	.....	1.7	7.0	5.0	24	6.1	.....
9	.....	3.5	6.8	5.0	31	10	.....
10	.....	2.0	7.5	5.0	29	9.6	.....
11	.....	28	7.2	5.1	26	6.4	.....
12	.....	95	3.5	4.8	27	5.1	.....
13	1.2	15	2.8	4.8	32	4.2	.....
14	1.0	6.6	3.3	5.4	25	5.0	.....
15	.4	12	.....	6.6	20	5.8	.....
16	4.2	10	.....	9.4	22	5.0	.....
17	10	21	.....	9.6	17	3.9	.....
18	4.6	19	.....	10	14	3.4	.....
19	7.4	10	.....	9.8	13	2.8	.....
20	4.2	6.3	.....	11	14	2.5	.....
21	5.8	6.4	.....	14	16	2.2	.....
22	3.0	6.5	.....	19	17	1.9	.....
23	2.6	7.6	6.7	22	17	1.6	.....
24	8.0	8.6	5.4	24	17	1.4	.....
25	4.9	14	4.9	36	17	1.4	.....
26	6.6	5.1	5.0	29	14	1.9	.....
27	4.7	5.4	5.8	24	13	3.6	.....
28	3.7	5.2	6.4	33	12	2.7	.....
29	2.8	5.2	.....	43	11	1.9	.....
30	2.2	5.0	.....	47	10	1.4	.....
31	2.1	2.5	.....	46	.....	.9	.....

NOTE.—Mean discharge estimated in 1.0 second-foot Dec. 6–12; and 4.0 second-feet February 15–22.

Monthly discharge of Keene Creek at Hyatt Prairie, near Ashland, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	10	0.4	3.14	193
January	95	1.6	10.4	640
February	35	.9	6.06	337
March	47	4.8	15.4	947
April	36	1.0	20.2	1,200
May	10	.9	4.67	287
The period	.....	.....	.....	3,600

SHASTA RIVER NEAR MONTAGUE, CALIF.

LOCATION.—In N. ½ NE. ¼ sec. 33, T. 45 N., R. 6 W., at highway bridge 1¼ miles southwest of Montague, Siskiyou County. Little Shasta River enters 1 mile above and Yreka Creek 5½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1911, to September 30, 1913; September 20, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections; lower section fastened to bridge pier on right bank; upper section to left abutment. Several changes in gage section have been made but original datum has been maintained. Gage read by D. S. Lucas and M. S. Merrill.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent. Banks are subject to overflow during very high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.1 feet March 19 (discharge, 440 second-feet); minimum stage recorded during year, 2.1 feet April 7 (discharge, from extension of rating curve, about 1.5 second-feet). Controlled by pumping above.

1911–1918: Maximum stage recorded, 4.3 feet at 9 a. m. January 19, 1913 (discharge, 712 second-feet); minimum stage recorded, 2.1 feet April 7, 1918 (discharge, 1.5 second-feet).

DIVERSIONS.—The Dwinnel ditch diverts about 30 second-feet 2 miles above the gage. The Grenada ditch diverts about 40 second-feet 12 miles above the gage. Some water is probably returned to the river above the gage. Other small ditches divert above the station. See miscellaneous measurements, page —.

REGULATION.—Considerable diurnal fluctuation at the gage due to itrigation above. Some water diverted for irrigation probably returns to river above the gage by seepage.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 25 and 400 second-feet and is an extension above and below. Gage read to tenths once daily from October 1 to June 30 and to quarter-tenths once daily from July 1, to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for irrigating season, which are fair.

Discharge measurements of Shasta River near Montague, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 13	3.03	84
23	3.23	127

Daily discharge, in second-feet, of Shasta River near Montague, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	149	177	315	277	207	177	177	25	25	8	25	33
2	149	240	315	240	177	177	177	25	35	17	65	25
3	149	277	277	207	177	177	149	25	83	16	48	30
4	149	207	240	207	177	177	126	25	83	17	30	35
5	126	207	207	177	177	207	65	25	65	14	25	33
6	104	207	207	207	207	177	83	25	65	10	23	30
7	104	177	207	177	355	177	1.5	35	48	10	25	30
8	94	207	177	207	315	207	1.5	25	48	16	35	42
9	83	177	177	207	207	207	3.0	25	35	25	21	48
10	48	177	207	207	177	149	6	25	35	48	25	56
11	25	207	207	207	207	149	6	35	25	51	23	65
12	6	240	177	240	177	177	6	35	17	45	25	83
13	35	207	177	240	149	177	149	25	17	25	21	94
14	65	207	177	207	149	177	126	25	25	14	17	115
15	104	207	207	207	149	207	126	25	25	14	25	177
16	104	207	207	240	149	177	83	42	35	25	35	163
17	115	177	207	207	177	177	104	35	35	21	65	149
18	126	177	207	207	177	177	83	42	25	17	65	149
19	138	149	240	207	177	440	104	48	25	14	48	126
20	149	149	240	177	207	315	83	35	25	14	45	126
21	177	177	207	207	177	177	65	35	25	16	42	126
22	149	177	240	207	207	149	48	35	25	33	35	126
23	126	149	177	177	177	177	48	35	65	27	30	133
24	104	149	207	207	177	207	35	35	48	65	33	122
25	177	149	240	207	207	207	48	48	35	27	48	124
26	177	149	240	207	177	207	48	48	35	25	56	122
27	207	149	240	207	177	240	48	35	17	45	65	115
28	177	207	207	207	177	240	35	25	14	27	62	126
29	83	277	207	207	.....	207	25	25	10	27	56	126
30	83	207	296	207	.....	207	25	25	21	25	65	128
31	177	.....	277	177	.....	207	.....	25	.....	17	35	.....

Monthly discharge of Shasta River near Montague, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	207	6	118	7,260
November	277	149	192	11,409
December	315	177	223	13,700
January	277	177	209	12,900
February	355	149	192	10,700
March	440	149	201	12,400
April	177	1.5	69.5	4,140
May	48	25	31.5	1,940
June	83	10	35.7	2,120
July	65	8	24.4	1,500
August	65	17	39.3	2,420
September	177	25	95.2	5,660
The year	440	1.5	119	86,100

EAST FORK OF SCOTT RIVER AT CALLAHAN, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 16, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge at Callahan, Siskiyou County, 800 feet above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1913 to September 30, 1918 (fragmentary).

GAGE.—Staff in two sections on left bank; lower section, inclined, fastened to cottonwood tree 10 feet above bridge; upper section, vertical, fastened to left abutment of bridge; read by F. H. Williams.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and small gravel; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.95 feet April 10 (discharge, 454 second-feet); minimum stage recorded, 5.0 feet October 8, 12, and July 31 (discharge, 4.2 second-feet).

1913–1918: Maximum stage recorded, 8.0 feet at 2 p. m. March 19, 1916 (approximate discharge, from extension of rating curve, 1,200 second-feet); minimum stage recorded, 4.9 feet August 31 and September 8, 1917 (discharge, 3.0 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since station was established. Rating curve well defined below 15 second-feet and between 100 and 250 second-feet; rest of curve has been drawn by estimation. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Record, good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:
September 14, 1918: Gage height, 5.32 feet; discharge, 14 second-feet.

Daily discharge, in second-feet, of East Fork of Scott River at Callahan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1							134					
2								204				
3			23			27		238				
4				23								
5			14		220		147					
6												
7			13									
8	4.2					23						
9				21			428		45			14
10			13				454	122				
11						27			38			
12	4.2	10		23								
13			10									
14					27							14
15				27			134			8.5	8.5	
16								89	20			
17		10	13			27	110			8.5		
18					12				19			
19												
20					110						8.5	
21		11					147		16			
22			13			69		60				
23												8.5
24			14									
25					32							
26		10				100						
27												
28	7				19		160	60				
29		160	32									
30				13								
31						134		60		4.2		

SCOTT RIVER AT CALLAHAN, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge three-fourths of a mile below junction of East and South forks, 1 mile northwest of Callahan, Siskiyou County. Wildcat Creek enters 500 feet above and Sugar Creek 1½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 12, 1911, to September 30, 1918 (fragmentary).

GAGE.—Vertical staff in three sections on right bank, installed November 14, 1912; original gage was just above power house about 2,000 feet above present site; present gage installed at independent datum, which on June 26, 1914, was raised 0.97 foot. Gage read by F. H. Williams.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.3 feet April 10 (discharge, 365 second-feet); minimum stage recorded, 0.55 foot August 27 (discharge, 6.5 second-feet).

1911–1918: Maximum stage recorded, 3.4 feet at 11.30 a. m. June 6, 1915 (discharge, 885 second-feet); minimum stage recorded, 0.55 foot August 27, 1918 (discharge, 6.5 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read occasionally to hundredths. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:

September 14, 1918: Gage height, 1.14 feet; discharge, 43 second-feet.

Daily discharge, in second-feet, of Scott River at Callahan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1								
2								
3				325				
4								
5			126					
6								
7								
8	9							
9					150			14
10			365	253				
11								
12	10			236				
13		104						
14								48
15			236			12	12	
16					74			
17			205			12		
18					66			
19								
20		205			60		12	
21			270					
22				162				
23								12
24								
25								
26		220						
27							6.5	
28	17		288	157				
29								
30		236						
31				150		9.5		

INDIAN CREEK NEAR HAPPY CAMP, CALIF.

LOCATION.—In NW. ¼ sec. 22, T. 17 N., R. 7 E., in Klamath National Forest, at highway bridge at Robert's ranch, 4¾ miles north of Happy Camp, Siskiyou County, and junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1918 (fragmentary).

GAGE.—Staff in three sections installed at bridge November 20, 1912. No. 1, vertical, fastened to stump on right bank 2 feet above bridge; No. 2, vertical, fastened to right abutment of bridge near downstream end; No. 3, inclined, fastened to alder tree on left bank 12 feet below bridge. Original gage was vertical staff, fastened to alder tree on left bank about 700 feet above bridge at an independent datum. Gage read by M. M. Morgan.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; permanent.

EXTREMES OF DISCHARGE.—1911–1918: Maximum stage recorded, 10.6 feet February 17, 1912 (discharge, from extension of rating curve, about 8,430 second-feet); minimum stage recorded, 2.5 feet August 19 to September 6, 1914 (discharge, 20 second-feet).

DIVERSIONS.—The Reeve Davis Consolidated Mining Co.'s ditch diverts water above and returns it to the stream below the station; but none was diverted this year. Other small ditches use water for mining.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 35 and 2,500 second-feet. Gage read occasionally to half-tenths. Daily discharge ascertained by applying gage height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:
September 16, 1918: Gage height, 2.82 feet; discharge, 50 second-feet.

Daily discharge, in second-feet, of Indian Creek near Happy Camp, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1												
2				265								38
3				295	235	395						
4												
5		57										
6	47				1,970		510		110			
7												
8	42					295	945	325	110			
9	42						945					
10					470							
11					450							
12												
13					412	395						
14							532					
15												
16												49
17						720				47		
18												
19			295		342							
20						720						
21												
22												
23			220									
24												
25						1,570						
26				295								
27												
28		57		235								
29						865						
30		2,930	430									38
31												

TRINITY RIVER AT LEWISTON, CALIF.

LOCATION.—In NE. ¼ sec. 19, T. 33 N., R. 8 W., at highway bridge at Lewiston, Trinity County, 9 miles below Stewarts Fork. Indian Creek enters 6 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 28, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections on left bank at bridge; lower section fastened to pile 10 feet above bridge; upper section fastened to downstream end of bridge abutment. Gage read by Leroy Phillips.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; practically permanent. Banks are subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.9 feet at 12 m. April 9 (discharge, 8,050 second-feet); minimum stage recorded, 1.85 feet September 3, 4, and 5 (discharge, 52 second-feet).

1911–1918: Maximum stage recorded, 16.7 feet at 12.30 p. m. January 2, 1914 (discharge, from extension of rating curve, about 26,900 second-feet); minimum stage recorded, 1.85 feet September 3, 4, and 5, 1918 (discharge, 52 second-feet).

DIVERSIONS.—Water is diverted above the station for irrigation, placer mining, and power development.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 8,000 second-feet; and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for very high water, which are probably good.

Discharge measurements of Trinity River at Lewiston, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 20	2.30	173
21	2.28	162

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SAN FRANCISCO, CALIF.

Daily discharge, in second-feet, of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	102	94	3,520	668	335	980	3,250	2,730	835	189	82	58
2	107	94	1,140	700	363	1,020	2,860	2,990	765	180	82	62
3	102	107	700	605	370	1,140	2,230	2,990	800	171	82	52
4	87	230	575	635	363	1,140	1,890	3,120	835	180	82	52
5	87	195	460	635	575	1,020	1,780	2,600	870	171	82	52
6	87	300	390	575	4,840	942	1,780	2,230	835	165	82	58
7	87	223	363	870	3,120	835	1,890	2,230	835	165	82	58
8	87	195	342	668	1,580	835	1,780	2,230	800	150	82	62
9	94	159	307	575	1,480	835	7,250	1,780	765	150	82	62
10	87	159	307	435	1,220	800	4,840	1,780	700	135	72	66
11	87	230	282	460	1,060	1,020	4,090	1,780	635	135	66	72
12	87	515	293	575	980	1,220	3,800	1,480	575	135	66	82
13	87	435	282	635	1,020	1,100	2,990	1,580	575	135	62	237
14	87	328	265	635	905	980	2,470	1,680	515	129	58	870
15	82	237	265	605	800	905	2,230	1,390	435	135	72	488
16	107	237	293	570	835	905	2,110	1,300	402	135	87	307
17	87	230	318	575	765	1,060	2,230	1,300	370	121	82	223
18	94	212	342	905	732	4,690	2,350	1,220	352	121	87	195
19	94	202	335	765	700	3,940	2,470	1,140	335	121	82	180
20	87	189	307	700	700	2,730	2,730	1,140	300	121	82	165
21	94	189	300	635	700	2,230	3,250	1,060	300	107	82	150
22	94	189	272	575	732	2,230	3,520	1,060	293	107	94	159
23	94	165	293	545	1,060	2,350	3,520	1,060	293	113	82	150
24	94	165	300	515	1,390	2,350	3,250	1,060	265	107	82	159
25	94	180	272	488	1,060	3,520	3,380	980	258	94	82	150
26	94	165	1,300	488	1,060	3,120	3,120	980	230	94	82	135
27	94	165	2,230	460	1,020	2,600	2,730	835	230	94	72	129
28	94	171	2,000	435	980	2,230	2,470	765	212	87	66	129
29	94	202	1,390	410	.....	2,230	2,470	765	195	82	62	141
30	94	4,690	1,060	410	.....	2,730	2,600	800	195	82	62	141
31	94	.....	870	378	.....	3,520	.....	905	.....	82	62	.....

Monthly discharge of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	107	82	92.3	5,680
November	4,690	94	362	21,500
December	3,520	265	689	42,400
January	905	378	585	36,000
February	4,840	335	1,100	61,100
March	4,690	800	1,850	114,000
April	7,250	1,780	2,910	173,000
May	3,120	765	1,580	97,200
June	870	195	500	29,800
July	189	82	129	7,930
August	94	58	76.8	4,720
September	870	52	161	9,580
The year	7,250	52	832	603,000

TRINITY RIVER AT HOOPA, CALIF.

LOCATION.—In NW. ¼ sec. 25, T. 8 N., R. 4 E., at Hoopa Indian Agency, Humboldt County, 1 mile above Hoopa Ferry and 11 miles above junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1911, to December 7, 1914, October 8, 1916, to September 7, 1918 (incomplete), when station was discontinued.

GAGE.—Staff in three sections on left bank 800 feet above mouth of Supply Creek; read by Oscar Brown.

DISCHARGE MEASUREMENTS.—Made from ferry cable 1 mile below gage. As Supply Creek enters between gage and ferry it is necessary to deduct discharge of this stream from measurements made at ferry to obtain flow at gage.

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet at 5.15 p. m. November 30 (discharge, 20,900 second-feet); minimum stage recorded, 4.08 feet September 6 and 7 (discharge, 230 second-feet).

1911–1918: Maximum stage recorded, 28.1 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 89,000 second-feet); minimum stage recorded, 4.08 feet September 6 and 7, 1918 (discharge, 230 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 1,300 second-feet, fairly well defined between 1,300 and 16,000 second-feet, and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by J. F. Kunesh:
August 30, 1918: Gage height, 4.12 feet; discharge, 237 second-feet.

Daily discharge, in second-feet, of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,010	370	15,100	3,640	2,010	4,820	8,670	5,400	2,130	660	330	230
2	1,010	370	6,690	2,770	2,130	4,820	8,670	5,400	2,130	660	330	230
3	930	525	4,290	2,250	2,250	5,810	7,900	5,010	2,010	605	330	230
4	930	578	2,910	2,250	2,250	6,240	6,920	5,010	2,010	605	330	230
5	930	690	2,250	2,370	2,910	5,600	6,690	4,640	2,010	605	295	230
6	930	892	1,680	2,250	9,200	5,010	6,240	4,640	2,010	550	295	230
7	855	855	1,470	2,250	18,200	4,820	6,020	4,640	2,010	550	295	230
8	785	720	1,470	2,250	13,200	4,640	6,020	4,290	2,010	550	295	.....
9	785	660	1,380	2,250	8,670	4,640	12,300	3,960	2,010	500	295	.....
10	720	660	1,380	2,250	6,690	4,640	14,100	3,490	2,010	500	295	.....
11	660	752	1,380	2,370	5,400	4,640	9,740	3,490	1,900	500	295	.....
12	550	1,180	1,380	3,340	5,810	5,810	8,150	3,340	1,900	455	295	.....
13	500	1,570	1,380	4,290	5,600	6,690	7,160	3,340	1,900	455	295	.....
14	455	1,230	1,570	4,640	5,400	6,460	6,460	3,190	1,790	455	312	.....
15	410	1,050	1,680	4,290	5,400	5,600	6,460	3,190	1,790	455	330	.....
16	410	855	1,790	4,290	5,600	5,600	6,460	3,190	1,570	455	330	.....
17	370	720	1,790	5,200	5,400	6,240	6,460	3,190	1,570	455	330	.....
18	370	720	1,680	5,010	5,400	11,400	6,460	3,050	1,470	455	330	.....
19	350	660	1,680	4,640	5,010	17,800	6,460	2,910	1,380	455	330	.....
20	350	605	1,570	3,960	4,640	12,000	6,920	2,910	1,280	410	330	.....
21	330	605	1,570	3,640	4,640	9,470	6,920	2,770	1,180	410	330	.....
22	350	605	1,570	3,050	4,640	8,670	6,460	2,630	1,100	410	330	.....
23	370	605	1,470	2,500	4,460	9,200	6,460	2,500	1,010	410	330	.....
24	370	605	1,470	2,370	4,460	12,000	6,240	2,500	930	410	295	.....
25	370	605	1,570	2,250	4,640	14,700	6,240	2,370	930	370	295	.....
26	370	605	2,250	2,250	5,010	11,700	6,240	2,370	855	370	295	.....
27	370	632	8,150	2,250	5,400	10,600	5,810	2,370	785	370	295	.....
28	370	785	6,690	2,130	5,010	9,470	5,400	2,250	720	370	295	.....
29	370	1,570	5,600	2,130	.....	8,670	5,010	2,250	660	330	260	.....
30	370	16,400	5,010	2,010	.....	9,200	5,200	2,250	660	330	245	.....
31	370	.....	3,960	2,010	.....	8,940	.....	2,130	.....	330	230	.....

Monthly discharge of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,010	330	559	34,400
November	16,400	370	1,290	76,800
December	15,100	1,380	3,030	186,000
January	5,200	2,010	3,000	184,000
February	18,200	2,010	5,690	316,000
March	17,800	4,640	7,930	488,000
April	14,100	5,010	7,140	425,000
May	5,400	2,130	3,380	208,000
June	2,130	660	1,520	90,400
July	660	330	466	28,700
August	330	230	305	18,800
September 1–7	230	230	230	3,190
The period				2,060,000

SMITH RIVER BASIN.

MIDDLE FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In NE. ¼ SE. ¼ sec. 20, T. 17 N., R. 2 E., at highway bridge 800 feet above junction of North and Middle forks, one-eighth mile east of Gasquet, and 14 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—146 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1918 (not complete).

GAGE.—Inclined staff in two sections on right bank 40 feet upstream from new bridge. A chain gage attached to downstream guard rail of old bridge was read previous to May 26, 1913, and at various times since, when staff gage could not be read. Original datum was not maintained. Gage read by A. W. Lewis.

DISCHARGE MEASUREMENTS. Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough; somewhat shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.4 feet at 2 p. m. November 30 (discharge, from extension of rating curve, about 12,700 second-feet); minimum stage recorded, 3.9 feet at 8.30 a. m. October 18 (discharge, 43 second-feet).

1911–1918: Maximum stage recorded, 17.5 feet at 1.30 p. m. November 25, 1915 (discharge, from extension of rating curve, about 14,300 second-feet); minimum stage recorded, 3.45 feet (chain gage) at 10 a. m. October 21, 1915 (discharge, 38 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 8,000 second-feet and extended above. Gage read to quarter-tenths once daily, sometimes twice. Daily discharge ascertained by applying mean daily gage-height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 10	4.01	53
Sept. 11	3.99	52

Daily discharge, in second-feet, of Middle Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	.....	.....	3,540	580	512	.....	.....
2	.....	.....	1,530	490	720	720	.....
3	50	174	985	512	720	770	770
4	.....	73	625	875	820	.....	720
5	.....	186	580	720	2,530	625	.....
6	.....	121	410	625	7,460	670	.....
7	.....	73	336	720	3,540	625	580
8	.....	60	319	720	1,690	625	.....
9	.....	55	.....	720	1,450	1,170	1,240
10	.....	55	.....	625	.....	1,170	.....
11	46	.....	.....	580	.....	1,100	.....
12	.....	302	.....	3,540	.....	1,530	.....
13	.....	141	.....	2,630	1,950	1,450	.....
14	46	88	.....	2,130	1,610	1,170	.....
15	.....	60	.....	1,860	1,170	.....	.....
16	46	60	.....	1,380	2,430	.....	535
17	.....	60	720	1,040	2,960	.....	535
18	48	50	820	1,770	1,950	.....	535
19	.....	50	625	1,610	1,380	.....	535
20	.....	50	535	.....	1,040	.....	535
21	.....	.....	490	.....	930	.....	.....
22	.....	.....	410	720	875	.....	.....
23	.....	.....	410	625	930	.....	.....
24	.....	.....	1,240	580	1,770	.....	.....
25	.....	.....	770	535	2,130	.....	.....
26	.....	.....	2,040	490	.....	.....	.....
27	.....	.....	1,950	450	.....	.....	.....
28	.....	5,380	.....	410	.....	.....	.....
29	.....	5,120	.....	.....	.....	.....	.....
30	.....	12,500	.....	410	.....	.....	.....
31	.....	.....	670	372	.....	.....	.....

NORTH FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 20, T. 17 N., R. 2E., half a mile northeast of Gasquet, half a mile above junction of North and Middle forks, and 15 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—About 81 square miles.

RECORDS AVAILABLE.—September 8, 1911 to September 30, 1918 (incomplete).

GAGE.—Staff in four sections on left bank installed December 5, 1911; read by A. W. Lewis. The original gage was washed out November 15, 1911; its datum was not referred to that of present gage.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough. Control has not shifted since the present gage was installed. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.0 feet at 2 p. m. November 30 (discharge, from extension of rating curve, about 20,200 second-feet); minimum stage recorded, 9.3 feet at 9.30 a. m. November 3 (discharge, 132 second-feet).

1911–1918: Maximum stage recorded, 27.5 feet at 2.30 p. m. November 25, 1915 (discharge, from extension of rating curve, about 28,200 second-feet); minimum stage recorded, 8.49 feet at 9 a. m. October 30, 1915 (discharge, 62 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 13,000 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records probably excellent.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 9	8.65	65
11	8.60	62

Daily discharge, in second-feet, of North Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1					590							
2				835	1,480	1,030						
3		132		745			790					
4				2,680	1,260							
5				2,280	6,350	1,030						
6					13,600	835						
7				2,280	4,480	790						
8			590	2,280	2,480	790						
9				1,640	2,000	2,680	2,680					
10				1,640								
11				1,560		2,100						
12		278		7,960		3,100						
13					2,990	2,190						
14				4,960	2,480	1,730						
15				3,210	2,100							
16				2,380	4,960		665					
17			3,210	2,100	5,630		625					
18			4,360	3,210	3,100		590					
19			2,000	2,190	2,190		555					
20			1,820		1,400		520					
21			1,640		1,260							
22			1,030	1,030								
23				835	1,030							
24			5,630	790								
25				745								
26			5,910	590								
27			5,910									
28				555								
29												
30		20,200		555								
31			1,260	520								

MISCELLANEOUS MEASUREMENTS.

Measurements of stream flow in the Pacific slope basins of California at points other than gaging stations are listed in the following tables:

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 10	Cottonwood Creek	Tia Juana River	SW. ¼ sec. 23, T. 18 S., R. 2 E., near Cottonwood.		5.1
10	Sweetwater River	Pacific Ocean	Dehesa		14
Jan. 1	Ellis flume	Diverts from Sweetwater River.	Opposite United States Geological Survey gaging station on Sweetwater River near Descanso.		.11
Aug. 8	do	do	do		.15
Mar. 7	San Diego River	Pacific Ocean	1 mile above diverting dam and one-eighth mile below Cedar Creek.		7.8
Nov. 7	Boulder Creek	San Diego River	Mouth	0.56	5.6
9	do	do	do	.36	1.8
Feb. 8	do	do	do	.80	19
Mar. 7	do	do	do	.43	4.4
Nov. 9	Cuyamaca Water Co.'s flume.	Diverts from San Diego River.	South Fork of San Diego River.	.54	3.5
10	do	do	do	.81	8.5
Feb. 8	do	do	do	1.52	22
Nov. 7	do	do	Chocolate Creek	.84	7.4
8	do	do	do	1.08	12
9	do	do	do	.56	3.6
10	do	do	do	.96	9.5
Feb. 8	do	do	do	1.51	23
Nov. 1	do	do	Grossmont	.38	1.5
7	do	do	do	.66	4.9
8	do	do	do	.90	9.3
9	do	do	do	.44	2.2
10	do	do	do	.35	1.3
Feb. 7	do	do	do	1.26	20
8	do	do	do	1.25	20
Sept. 7	do	do	do	.35	1.7
Feb. 8	South Fork of San Diego River.	San Diego River	Mouth	.12	.08
Mar. 7	do	do	do		.1
Nov. 7	South Fork flume	Diverts from South Fork of San Diego River.	Entire flow of South Fork diverted into flume.	3.70	1.6
8	do	do	do	3.66	1.2
9	do	do	do	3.65	1.1
Feb. 8	do	do	New gage installed	.42	1.9
Mar. 7	do	do	One-fourth mile above junction with Cuyamaca Water Co.'s flume.		4.6
Dec. 23	San Vicente Creek	San Diego River	Foster		.1
Mar. 8	do	do	do		.1
14	do	do	Foster. Stage 3.0 feet higher on March 12.		77
May 8	do	do	Foster		.1
Feb. 7	La Mesa ditch		Outlet near La Mesa	1.97	18
7	do		Intake near La Mesa	1.90	17
8	do		Intake near Grossment	1.87	18
8	do		Outlet near La Mesa	1.94	16
Nov. 17	East San Pasqual ditch	Diverts from Santa Ysabel Creek.	20 feet below intake		1.5
Dec. 25	do	do	do		3.8
Nov. 14	Escondido Creek	Pacific Ocean	San Elijo dam site on Santa Fe ranch near San Marcos.		.02
Jan. 26	do	do	do	2.40	11
30	do	do	do	2.00	.08
Feb. 18	do	do	do	2.17	1.2
22	do	do	do	2.28	4.8
27	do	do	do	2.09	.28
Mar. 8	do	do	do	2.28	3.6
13	do	do	do	2.85	107
16	do	do	do	1.50	13
23	do	do	do	1.54	12

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Streams south of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 28	Escondido Creek	Pacific Ocean	San Elijo dam site on Santas Fe ranch near San Marcos.	1.42	4.4
Apr. 6	do	do	do	1.39	2.7
11	do	do	do	1.28	1.7
18	do	do	do	1.20	1.0
Dec. 30	San Luis Rey River	do	500 feet below mouth of Agua Tibia Creek and 3 miles above Pala.		17
Dec. 16	do	do	Oceanside	8.72	7.5
Feb. 19	do	do	do	9.26	66
Mar. 24	do	do	do		45
Apr. 23	do	do	do	8.82	13
June 3	Temecula Creek	Santa Margarita River	300 feet above junction with Murrietta Creek.		8.4
June 3	Murrietta Creek	do	Just above junction with Temecula Creek.		.8
July 25	Southern California Edison Co.'s canal.	Diverts from Santa Ana River.	Sand box just below Santa Ana River No. 2 power plant.		80
Jan. 31	do	do	200 feet above forebay at Santa Ana River No. 3 power plant.		44
July 25	do	do	400 feet above forebay at Santa Ana River No. 3 power plant.		75
Jan. 21	do	Diverts from San Gabriel River.	Tunnel 4A		29
30	do	do	do		31
July 18	do	do	do		47
Jan. 21	Azusa canal		300 feet below Southern California Edison Co.'s power plant near Azusa.		20
30	do		do		22
30	Duarte canal		Three-eighths mile below Southern California Edison Co.'s power plant near Azusa.		8
Oct. 24	Eaton Creek	Rio Hondo	Air to air tunnel		.05
24	do	do	Tollhouse bridge		0
24	do	do	Lower intake dam		0
24	do	do	Second point of measurement.		0
24	do	do	Below tunnel intake		0
Oct. 16	Millard Creek	Arroyo Seco	Mouth		0
Nov. 3	do	do	do		0
Dec. 1	Ditch	Divert from Tujunga Creek.	6 feet above sand box near Bryant's spring.		2.0
1917.					
Jan. 4	West Fork of Sespe Creek.	do	Mouth	2.23	10
4	Coldwater Creek	do	do	1.87	2.0
4	Little Sespe Creek	do	do	1.50	2.8
Aug. 2	Fillmore Land & Water Co.'s canal.	Diverts from Sespe Creek.	1,000 feet below intake		20
May 21	West Fork of Gavioto Creek.	Pacific Ocean	One-fourth mile above junction with Canada del Los Cruces.		1.1
May 23	Santa Ynez River	do	300 feet above junction with Mono Creek.		18
June 14	do	do	Just above junction with Mono Creek.		7.0
Aug. 1	do	do	do		1.0
May 22	do	do	450 feet above mouth of Santa Cruz Creek.		67
July 30	do	do	300 feet above mouth of Santa Cruz Creek.		4.6
May 22	do	do	San Lucas Bridge, 3¾ miles southeast of Santa Ynez.		104
July 30	do	do	do		9.6
May 23	Mono Creek	San Ynez River	50 feet above mouth		21
June 14	do	do	Just above mouth		8.3
Aug. 1	do	do	do		2.0
May 23	Camuesa Creek	do	do		2.2
June 14	do	do	do		.7
Aug. 1	do	do	do		.4

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Streams south of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1917.				*Feet.*	*Sec.-ft.*
May 23	Gidney Creek	San Ynez River	Mouth. Stream enters from south 1 mile below Camuesa Creek.		1.0
June 14	do	do	do		.24
May 24	Devils Canyon Creek	do	Mouth. Stream enters from south 1,000 feet below Gibraltar dam.		.6
May 31	do	do	do		.3
June 14	do	do	do		.13
May 22	Santa Cruz Creek	do	300 feet above mouth		20
July 30	do	do	do		2.3
Aug. 4	San Lorenzo River	Pacific Ocean	1,500 feet above bridge at old powder mill near Santa Cruz.		8.6
	Tulare Lake basin.				
June 24	Deer Creek	Tulare Lake	Highway bridge on Porterville, Hot Springs road, near Porterville, Calif.		.1
24	North Fork of Tule River.	Tule River	Milo, Calif.		.2
	San Joaquin River basin.				
Nov. 10	San Joaquin River	Suisun Bay	North Fork, Calif.	7.60	373
Oct. 30	Miami Creek	Fresno River	Miami Lodge, near Nipinnawasee, Calif.		3.0
31	Sugar Pine Lumber Co.'s flume.	Diverts from Fresno River.	Knowles, Calif.		6.5
31	do	do	do		11.2
Aug. 22	Fresno flume	do	do		3.6
Oct. 24	Merced River	San Joaquin River	Sentinel Bridge, at Yosemite, Calif.	2.19	15
Sept. 16	do	do	do	2.95	174
Nov. 1	do	do	300 feet above mouth, near Newman, Calif.		71
Oct. 29	Big Creek	South Fork of Merced River.	200 feet above mouth, at Wawona, Calif.		10
June 25	Upper Eleanor Creek	Lake Eleanor	One-fourth mile above mouth near Sequoia, Calif.		131
July 9	do	do	500 feet above lake near Sequoia, Calif.		33
June 25	Frog Creek	do	50 feet above mouth near Sequoia, Calif.		30
July 9	do	do	Weir 800 feet above lake near Sequoia, Calif.		16
June 25	Kibbie Creek	do	800 feet above mouth near Sequoia, Calif.		6
July 9	do	do	do		2
Nov. 16	Golden Rock ditch	South Fork of Tuolumne River.	Abandoned United States Geological Survey gaging station 800 feet below intake at Harden ranch, near Sequoia, Calif.	1.22	11
July 26	Clavey Creek	Tuolumne River	At abandoned United States Geological Survey gaging station near Tuolumne, Calif.	10.03	32
26	North Fork of Tuolumne River.	do	Opposite Tuolumne ranger station, near Tuolumne, Calif.		3.8
Oct. 1	Stanislaus River	San Joaquin River	Stanislaus, Calif.		325
2	do	do	do		453
18	North Fork of Stanislaus River.	Stanislaus River	400 feet above mouth		11
22	do	do	do		13
7	do	do	100 feet above Griswold Creek.		5.9
7	Mill Creek	North Fork of Stanislaus River.	Mouth		.5

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

San Joaquin River basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 7	Griswold Creek	North Fork of Stanislaus River.	Mouth		3.6
1-11	Rose Creek	....do	....do		.0
July 31	North main of Oakdale canal.	Diverts from Oakdale canal, which diverts from Stanislaus River.	800 feet below point of diversion, near Knights Ferry, Calif.	2.40	60
July 4	Licking Fork of Mokelumne River.	Mokelumne River.	Abandoned United States Geological Survey station near Railroad Flat, Calif.	1.88	1.4
Feb. 16	Bellota Slough	Calaveras River	Bellota, Calif.	.99	105

Sacramento River basin.

Nov. 26	Sacramento River	Suisun Bay	Hamilton, Calif.		4,785
25	....do	....do	Butte City, Calif.	0	5,178
23	....do	....do	Colusa, Calif.	.43	5,147
22	....do	....do	Knights Landing, Calif.		5,470
30	North Fork of Pit River.	Pit River	Alturas, Calif.		11
May 27	....do	....do	....do		3.6
June 27	....do	....do	....do		1.9
July 26	Montgomery Creek	....do	Montgomery Creek, Calif.		17
Nov. 26	Stoney Creek	Sacramento River	St. Johns, Calif.		2
24	Butte Slough	....do	100 feet above mouth at Colusa, Calif.		115
24	Sycamore Slough	....do	Sycamore, Calif.		0
Oct. 7	Bear River	Feather River	Abandoned gaging station near Colfax, Calif.	[a] 1.80	4.0
May 7	....do	....do	....do	2.35	48
July 18	....do	....do	....do	[a] 1.05	1.3

Streams north of San Francisco Bay.

Aug. 27	Eel River	Pacific Ocean	Dos Rios, Calif.		4.1
29	....do	....do	Fernbridge, Calif.	—0.4	51
27	South Eel River	Eel River	Dos Rios, Calif.		0
28	South Fork of Eel River.	....do	Gaberville, Calif.	—0.36	27
29	Van Duzen River	....do	Alton, Calif.		0
30	North Fork of Mad River.	Mad River	Korbel, Calif.		0
30	Redwood Creek	Pacific Ocean	Bairs, Calif.	5.25	4.0
30	....do	....do	Orick, Calif.	4.20	3.6
Sept. 23	Shasta River	Klamath River	500 feet above Lucerne pumping plant at Grenada.		99
23	....do	....do	200 feet above Dwinnel pumping plant at Montague.		126
23	Big Springs outlet	Shasta River	Mayten, Calif.		27
23	Mount Shasta Land and Irrigation ditch.	Diverts from Big Springs reservoir.	....do		41
23	Stallcup ditch	....do	....do		6.8
23	Grenada ditch	Diverts from Shasta River.	200 feet below Lucerne pumping plant at Grenada.		25
16	Reeve-Davis Consolidated Mining Co.'s flume.	Diverts from Indian Creek.	Happy Camp, Calif.		0
Aug. 30	Supply Creek	Trinity River	Hoopa, Calif.		3.2
Sept. 6	South Fork of Smith River.	Smith River	Crescent City, Calif.		103

[a] Staff out of water: gage reading not very accurate.

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Klamath River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
May 8	Irvine Creek	Williamson River above Klamath Marsh.	Jackson Ranch		13.2
Apr. 30	Big Spring Creek	Williamson River, in Klamath Marsh.	Below tributary on Lenz ranch, in sec. 22, T. 30 S., R. 8 E.		44.7
Oct. 23	Brown Creek	Sprague River	Near dam, just below spring		7.3
May 5	....do	....do	....do		6.3
25	Sycan River	....do	Lower end of Sycan Marsh		38.7
9	Choctoot Creek	Sycan River	Border of Sycan Marsh, in sec. 10, T. 32 S., R. 14 E.		1.3
13	Coyote Creek	....do	West side of Sycan Marsh		2.4
Aug. 5	Lost River	Tule Lake	Harpould's dam		43.9
5	....do	....do	Brotherton ranch, in sec. 21, T. 39 S., R. 11½ E.		38.6
Oct. 19	Fort Creek	Wood River	Near Fort Klamath, in sec. 26, T. 33 S., R. 7½ E.	1.35	86
May 28	....do	....do	....do	1.65	79
Oct. 19	Crooked Creek	....do	Klamath Agency, in sec. 13, T. 34 S., R. 7½ E.	1.62	88
May 28	....do	....do	....do	1.08	74
Mar. 21	Jenny Creek	Klamath River	Klamath road crossing, in sec. 34, T. 39, S, R. 4 E.		112
21	Johnson Creek	Jenny Creek	Near Pinehurst		18.9

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STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the annual reports, bulletins, professional papers, and monographs.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Harrisburg, Pa., care of Water Supply Commission of Pa.
Asheville, N. C., 33–35 Broadway.
Chattanooga, Tenn., 605 Temple Court Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Chicago, Ill., 1404 Kimball Building.
Ames, Iowa, care of State Highway Commission.
Helena, Mont., 52 Montana National Bank Building.
Topeka, Kans., 23 Federal Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Boise, Idaho, 615 Idaho Building.
Idaho Falls, Idaho, 228 Federal Building.
Austin, Tex., Capitol Building.
Portland, Oreg., 606 Post Office Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 619 Federal Building.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 4,510 points in the United States, and the data obtained have been published in the reports tabulated below.

Stream-flow data in reports of the United States Geological Survey.

[A—Annual Report; B—Bulletin; W—Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1893 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 149	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River, and western United States.	1898.
20th A, pt. 4	Monthly dischrge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	....do	1903.
W 124 to 135	....do	1904.
W 165 to 178	....do	1905.
W 201 to 214	....do	1906.
W 241 to 252	....do	1907–8.
W 261 to 272	....do	1909.
W 281 to 292	....do	1910.
W 301 to 312	....do	1911.
W 321 to 332	....do	1912.
W 351 to 362	....do	1913.
W 381 to 394	....do	1914.
W 401 to 414	....do	1915.
W 431 to 444	....do	1916.
W 451 to 464	....do	1917.
W 471 to 484	....do	1918.

NOTE.—No data regarding stream-flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1918. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1918, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, and 471, which contain records for the New England streams from 1903 to 1918. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1918.

Year.	I North Atlantic slope basins (St. John River to York River).	II South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	III Ohio River basin.	IV St. Lawrence River basins.	V Hudson Bay and upper Mississippi River basins.	VI Missouri River basin.	VII Lower Mississippi River basin.	VIII Western Gulf of Mexico basins.	IX Colorado River basin.	X Great Basin.	XI Pacific slope basins in California.	XII North Pacific slope basins.		
												Pacific slope basins in Washington and upper Columbia River basin.	Snake River basin.	Lower Columbia River basin and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[o] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	385	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohawk River only.
[f] Kings and Kern rivers and south Pacific slope drainage basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are taken up in order around the rim of the lake.

PRINCIPAL STREAMS.

The rivers draining into the Pacific Ocean from California include San Diego, San Dieguito, San Luis Rey, Santa Ana, San Gabriel, Los Angeles, Santa Ynez, Santa Maria, and Salinas rivers, draining areas south of San Francisco Bay; San Joaquin River, whose chief tributaries are Kings, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers; Sacramento River, whose principal tributaries are Pit, Feather, and American rivers; and Russian, Eel, Mad, Klamath, and Smith rivers, which flow into the ocean north of San Francisco Bay. Except Klamath River, which receives the drainage from a small area in Oregon, and a few streams in Oregon that flow into Goose Lake, at the head of Pit River, all the streams in this division are entirely in California.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. xxiv.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1918; period after date indicates discontinuance.

DRAINAGE BASINS SOUTH OF SAN FRANCISCO BAY.

Tia Juana River near Nestor, Calif., 1915.
Cottonwood Creek near Morena reservoir, Calif., 1916.
Cottonwood Creek near Dulzura, Calif., 1906–1915.
Dulzura conduit near Dulzura, Calif., 1909–1915.
Pine Valley Creek near Jamul, Calif., 1906–1908.
Sweetwater River near Descanso, Calif., 1905–
Sweetwater River near Dehesa, Calif., 1913–1916.
Sweetwater River at Sweetwater dam, Calif., 1916.
San Diego River at diverting dam, near Lakeside, Calif., 1912–1916.
San Diego River at Lakeside, Calif., 1905–1916.
San Diego River near Santee, Calif., 1912–

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San Joaquin River tributaries—Continued.
Chowchilla Creek at base of foothills, near Buchanan, Calif., 1878–1884.
Mariposa Creek at base of foothills, Mariposa County, Calif., 1878–1884.
Bear Creek at base of foothills, Merced County, Calif., 1878–1884.
Merced River above Illilouette Creek, near Yosemite, Calif., 1915–16.
Merced River at Happy Isles Bridge, near Yosemite, Calif., 1915–
Merced River at Pohono Bridge, near Yosemite, Calif., 1916–
Merced River at Yosemite, Calif., 1904–1909; 1912–1916.
Merced River at Exchequer, Calif., 1915–
Merced River near Merced Falls, Calif., 1901–1913.
Merced River at Merced Falls, Calif., 1878–1884.
Merced River near Newman, Calif., 1912.
Illilouette Creek near Yosemite, Calif., 1915–16.
Tenaya Creek near Yosemite, Calif., 1904–1909; 1912–
Yosemite Creek at Yosemite, Calif., 1904–1909; 1912–
South Fork of Merced River near Wawona, Calif., 1910–
Big Creek near Wawona, Calif., 1910–11.
Tuolumne River at Hetch Hetchy cabin, near Sequoia, Calif., 1910–1916.
Tuolumne River at Hetch Hetchy dam site, near Sequoia, Calif., 1901; 1910–1915.
Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., 1914–
Tuolumne River near Buck Meadows [Groveland], Calif., 1907–
Tuolumne River above La Grange dam, near La Grange, Calif., 1915–
Tuolumne River near La Grange, Calif., 1895–1917.
Tuolumne River at Modesto, Calif., 1878–1884; 1891–1897.
Falls Creek near Sequoia, Calif., 1915–
Cherry Creek near Sequoia, Calif., 1901; 1910–
Eleanor Creek near Sequoia, Calif., 1909–
Evaporation from Lake Eleanor near Sequoia, Calif., 1915–
Jawbone Creek near Tuolumne, Calif., 1910–1915.
Corral Creek near Groveland, Calif., 1910–1913.
South Fork of Tuolumne River near Sequoia, Calif., 1914–1918.
South Fork of Tuolumne River near Buck Meadows [Groveland], Calif., 1910–
Middle Fork of Tuolumne River near Buck Meadows, Calif., 1916–
Golden Rock ditch near Sequoia, Calif., 1914–15.
Clavey River near Tuolumne, Calif., 1910–1913.
Indian Creek near Tuolumne, Calif., 1910–11.
North Fork of Tuolumne River near Tuolumne, Calif., 1910–11.
Hunter Creek near Tuolumne, Calif., 1910–1913.
La Grange [Yosemite] [Sierra and San Francisco] Water & Power Co.'s canal near La Grange, Calif., 1908–
Modesto canal near La Grange, Calif., 1903–
Turlock canal near La Grange, Calif., 1899–
Stanislaus River, Middle Fork, at Sand Bar Flat, near Avery, Calif., 1905–
Stanislaus River near Knights Ferry, Calif., 1915–
Stanislaus River at Knights Ferry, Calif., 1903–1916.
Stanislaus River at Oakdale, Calif., 1878–1884; 1895–1900.
Relief reservoir near Baker Station, Calif., 1910–
Relief Creek near Baker Station, Calif., 1910–
North Fork of Stanislaus River near Avery, Calif., 1914–
Utica Gold Mining Co.'s canal near Avery, Calif., 1914–
Rose Creek near Jupiter, Calif., 1910–1913.
Knight Creek near Jupiter, Calif., 1910–1913.

San Joaquin River tributaries—Continued.
Stanislaus River tributaries—Continued.
South Fork of Stanislaus River at Strawberry, Calif., 1911–1917.
South Fork of Stanislaus River near Columbia, Calif., 1910–1913.
South San Joaquin canal near Knights Ferry, Calif., 1913–
Oakdale canal near Knights Ferry, Calif., 1913–
Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry, Calif., 1904–1913.
Calaveras River at Jenny Lind, Calif., 1907–
Calaveras River near Bellota, Calif., 1878–1884.
Mokelumne River, North Fork, near West Point, Calif., 1917–
Mokelumne River at Electra, Calif., 1901; 1903–4.
Mokelumne River at Lone Star Mill, Calif., 1878–1884.
Mokelumne River near Clements, Calif., 1904–
Mokelumne River at Lodi, Calif., 1891–1895.
Middle Fork of Mokelumne River at West Point, Calif., 1911–
South Fork of Mokelumne River near Railroad Flat, Calif., 1911–
Licking Fork of Mokelumne River near Railroad Flat, Calif., 1911–1917.
Dry Creek near Ione, Calif., 1911–12.
Dry Creek at base of foothills, San Joaquin County, Calif., 1878–1884.
Cosumnes River, North Fork, near Pleasant Valley, Calif., 1906–7.
Cosumnes River, North Fork, near Eldorado, Calif., 1911–
Cosumnes River at Michigan Bar, Calif., 1907–
Cosumnes River below Michigan Bar, Calif., 1878–1884.
Sly Park Creek at Park, Calif., 1906.

GOOSE LAKE BASIN.

Drews Creek reservoir near Lakeview, Oreg., 1913–
Drews Creek near Lakeview, Oreg., 1909–
Dog Creek near Lakeview, Oreg., 1912–13.
North Drews canal near Lakeview, Oreg., 1914–
Cottonwood Creek near Lakeview, Oreg., 1908–
Thomas Creek near Lakeview, Oreg., 1912–1917.

SACRAMENTO RIVER BASIN.

Sacramento River at Castella, Calif., 1910–1918.
Sacramento River at Antler, Calif., 1910–11.
Sacramento River at Jellys Ferry, Calif., 1895–1902.
Sacramento River near Red Bluff, Calif., 1902–
Sacramento River at Red Bluff, Calif., 1894–1896.
Sacramento River at Collinsville, Calif., 1878–1885.
Pit River near Canby, Calif., 1904–5.
Pit River near Bieber, Calif., 1904–1908; 1913–14.
Pit River at Henderson, Calif., 1910–
Pit River near Ydalpom, Calif., 1910–
South Fork of Pit River near Ivy, Calif., 1904–5.
West Valley Creek near Likely, Calif., 1904–5.
Pine Creek near Alturas, Calif., 1918–
Ash Creek at Adin, Calif., 1904–5.
Fall River at Fall River Mills, Calif., 1912–13.
Hat Creek at Hawkin's ranch, near Hat Creek, Calif., 1911–1913.

Sacramento River tributaries—Continued.
Pit River tributaries—Continued.
Hat Creek at Hat Creek, Calif., 1910–1917.
Rising River near Cassel, Calif., 1911–1914.
Burney Creek near Burney, Calif., 1911–1913.
Kosk Creek near Henderson, Calif., 1910–1916.
Montgomery Creek at Montgomery Creek, Calif., 1911–1913.
Squaw Creek near Ydalpom, Calif., 1911–1913.
McCloud River near Gregory, Calif., 1902–1908.
McCloud River at Baird, Calif., 1910–
Clear Creek near Shasta, Calif., 1911–1913.
Cow Creek, at Millville, Calif., 1911–1914.
Clover Creek at Millville, Calif., 1911–1914.
Little Cow Creek at Palo Cedro, Calif., 1911–1914.
Bear Creek near Millville, Calif., 1911–1914.
North Fork of Cottonwood Creek at Ono, Calif., 1907–1914.
Mill Creek near Los Molinos, Calif., 1909–1913.
Deer Creek near Nina, Calif., 1911–1915.
Stony Creek near Stonyford, Calif., 1913–1914.
Stony Creek near Fruto, Calif., 1901–1912.
Little Stony Creek near Lodoga, Calif., 1907–
Feather River, North Fork, above Prattville, Calif., 1905–1907.
Feather River, North Fork, near Prattville, Calif., 1905–
Feather River, North Fork, at Big Bar, Calif., 1911–
Feather River, North Fork, at Big Bend, Calif., 1905–1910.
Feather River at Oroville, Calif., 1902–
Hamilton Branch near Prattville, Calif., 1905–1907.
Butt Creek at Butte Valley, Calif., 1905–
Indian Creek near Crescent Mills, Calif., 1906–1909; 1911–1918.
Spanish Creek at Keddie, Calif., 1911–
Middle Fork of Feather River at Sloat [near Cromberg], Calif., 1910–
Middle Fork of Feather River near Oroville, Calif., 1911–
Grizzly Creek near Beckwith, Calif., 1905–6.
South Fork of Feather River at Enterprise, Calif., 1911–
Palermo Land & Water Co.'s canal at Enterprise, Calif., 1911–
Yuba River, Middle Fork, near North Juan, Calif., 1900; 1910–
Yuba River at Smartsville, Calif., 1903–
Yuba River at Parks Bar bridge, near Smartsville, Calif., 1900.
Oregon Creek near North San Juan, Calif., 1910–
North Fork of Yuba River near Sierra City, Calif., 1911–1913.
North Fork of Yuba River at Goodyear Bar, Calif., 1910–
North Fork of Yuba River near North San Juan, Calif., 1900.
North Fork of North Fork of Yuba River at Downieville, Calif., 1910–
Rock Creek at Goodyear Bar, Calif., 1910–
Goodyear Creek at Goodyear Bar, Calif., 1910–
Bear River near Colfax, Calif., 1911–1917.
Bear River at Van Trent, Calif., 1904–
Bear River canal near Colfax, Calif., 1912–
American River, North Fork, near Colfax, Calif., 1911–
American River at Fairoaks, Calif., 1904–
Middle Fork of American River near East Auburn, Calif., 1911–
Rubicon River at Rubicon Springs, Calif., 1910–1914.

Stony Creek tributaries—Continued.
American River tributaries—Continued.
Middle Fork of American River tributaries—Continued.
Rubicon River near Quintette, Calif., 1909–1914.
Little Rubicon River near Rubicon Springs, Calif., 1910–11.
Little South Fork of Rubicon River at sawmill near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River below Gerle Creek near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River at mouth, near Quintette, Calif., 1909–1911.
Gerle Creek near Rubicon Springs, Calif., 1910–1914.
Little South Fork ditch at sawmill near Quintette, Calif., 1910–1913.
Pilot Creek near Quintette, Calif., 1910–1914.
Pilot Creek ditch near Quintette, Calif., 1910–1914.
South Fork of American River at Kyburz, Calif., 1906–7.
South Fork of American River near Kyburz, Calif., 1906.
South Fork of American River below Kyburz, Calif., 1907.
South Fork of American River near Placerville, Calif., 1911–
Clear Lake at Lakeport, Calif., 1874–1900; 1913–
Cache Creek at Lower Lake, Calif., 1901–1915.
Cache Creek at Yolo, Calif., 1903–
Putah Creek near Guenoc, Calif., 1904–1906.
Putah Creek at Winters, Calif., 1905–

DRAINAGE BASINS NORTH OF SAN FRANCISCO BAY.

RUSSIAN RIVER BASIN.

Russian River near Ukiah, Calif., 1911–1913.
Russian River at Geyserville, Calif., 1910–1913.
East Fork of Russian River near Ukiah, Calif., 1911–1913.

MATTOLE RIVER BASIN.

Mattole River near Petrolia, Calif., 1911–1913.

EEL RIVER BASIN.

South Eel River at Hearst, Calif., 1910–1913.
Eel River at Two Rivers, Calif., 1911–1913.
Eel River at Scotia, Calif., 1910–1915; 1916–
Middle Eel River near Covelo, Calif., 1911–
South Fork of Eel River at Garberville, Calif., 1911–1913.
Van Duzen River at Bridgeville, Calif., 1911–1913.
Yager Creek at Carlotta, Calif., 1911–1914.

MAD RIVER BASIN.

Mad River near Arcata, Calif., 1910–1913.

REDWOOD CREEK BASIN.

Redwood Creek near Korbel, Calif., 1911–1913.
Redwood Creek at Orick, Calif., 1911–1913.

KLAMATH RIVER BASIN.

Williamson River near Silver Lake, Oreg., 1917–
Williamson River (head of Klamath River) above Spring Creek, near Klamath Agency [Chiloquin], Oreg., 1908–1910; 1912–13; 1917–
Williamson River at Chiloquin, Oreg., 1911–1917.
Williamson River below Sprague River near Chiloquin, Oreg., 1917–
Upper Klamath Lake near Klamath Falls, Oreg., 1904; 1906–
Link River at Klamath Falls, Oreg., 1904–
Klamath River below Klamath Falls, Oreg., 1907–1909.
Klamath River at Keno, Oreg., 1904–1913.
Klamath River at Spencer Bridge, near Keno, Oreg., 1913–
Klamath River near Seiad Valley, Calif., 1912–
Klamath River near Happy Camp, Calif., 1911–12.
Klamath River near Requa, Calif., 1910–
Miller Creek near Crescent, Oreg., 1911–1914.
Scott Creek near Fort Klamath, Oreg., 1917–18.
Sand Creek near Fort Klamath, Oreg., 1917–
Sprague River, North Fork, near Bly, Oreg., 1917–18.
Sprague River near Beatty [above Yainax], Oreg., 1912–
Sprague River near (below) Yainax, Oreg., 1904.
Sprague River at Chiloquin, Oreg., 1911–
Sprague River Irrigation Co.'s canal near Bly, Oreg., 1918–
Fivemile Creek near Bly, Oreg., 1917–
Sycan River near Silverlake, Oreg., 1905–6; 1918–
Sycan River near Beatty [Yainax], Oreg., 1911–
Long Creek near Silver Lake, Oreg., 1918–
Whiskey Creek near Beatty, Oreg., 1917–
Modoc Point canal neat Chiloquin, Oreg., 1915–
Wood River at Fort Klamath, Oreg., 1911–
Anna Creek at Crater Lake post office, Oreg., 1913.
Fourmile Creek near Odessa, Oreg., 1912–1917.
"A" canal at Klamath Falls, Oreg., 1911–
Lost River near Clear Lake, Calif., 1904–1909.
Lost River above Olene, Oreg., 1915–1917.
Lost River at Olene, Oreg., 1904; 1907–1912.
Lost River at Wilson Bridge near Olene, Oreg., 1912–
Lost River at Merrill, Oreg., 1916.
Lost River near Merrill, Oreg., 1904–1909.
Tule Lake near Merrill, Oreg., 1904–
Miller Creek near Lorella, Oreg., 1909–
Olene Wasteway at Olene, Oreg., 1915–
Lost River diversion canal near Klamath Falls, Oreg., 1912–
G canal [4] at Lost River dam near Olene, Oreg., 1912–
Lower Klamath Lake near Mount Dome [Brownell], Calif., 1907–1909; 1912–1918.
Beaver Creek near Lilyglen, Oreg., 1916–
Keene Creek near Ashland, Oreg., 1916–
Shasta River near Montague, Calif., 1911–1913; 1916–
Scott River, East Fork, near Callahan, Calif., 1910–1913.
Scott River, East Fork, at Callahan, Calif., 1913–
Scott River at Callahan, Calif., 1911–
Scott River near Scott Bar, Calif., 1911–1913.

[4] Formerly called Griffith lateral.

Klamath River tributaries—Continued.
Indian Creek near Happy Camp, Calif., 1911–
Reeve Davis flume near Happy Home, Calif., 1911–1913.
Salmon River at Somesbar, Calif., 1911–1915.
Trinity River near Trinity Center, Calif., 1910–1913.
Trinity River at Lewiston, Calif., 1911–
Trinity River near China Flat, Calif., 1911–1913.
Trinity River at Hoopa, Calif., 1911–1914; 1916–1918.
Coffee Creek at Coffee, Calif., 1910–1914.
East Fork of Trinity River near Trinity Center, Calif., 1910–1914.
Swift Creek near Trinity Center, Calif., 1910–1914.
North Fork of Trinity River at Helena, Calif., 1911–1914.
South Fork of Trinity River near China Flat, Calif., 1911–1913.

SMITH RIVER BASIN.

Smith River, Middle Fork, near Crescent City, Calif., 1911–
North Fork of Smith River near Crescent City, Calif., 1911–
South Fork of Smith River near Crescent City, Calif., 1911–1913.

REPORTS ON WATER RESOURCES OF PACIFIC SLOPE BASINS OF CALIFORNIA.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-Supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*17. Irrigation near Bakersfield, Calif., by C. E. Grunsky. 1898. 96 pp., 16 pls.

*18. Irrigation near Fresno, Calif., by C. E. Grunsky. 1988. 94 pp., 14 pls.

*19. Irrigation near Merced, Calif., by C. E. Grunsky. 1899. 59 pp., 11 pls.

Water-supply Papers 17, 18, and 19 discuss the development of irrigation in the San Joaquin Valley, outline physiographic features, and give history of the various irrigation districts. Chiefly of historic interest as indicated by dates of publication.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

Describes the location and construction of various types of canals for irrigation.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp. 11 pls. 15c.

Gives elevations and distances along Sacramento, Pit, Feather, Yuba, American, Cosummes, Mokelumne, Calaveras, Toulumne, and Klamath rivers, California.

*45. Water storage on Cache Creek, Calif., by A. E. Chandler. 1901. 48 pp., 10 pls. 15c.

Discusses topography, precipitation, stream measurements, ground waters, and irrigation works in Cache Creek basin; includes description of Clear Lake.

46. Physical characteristics of Kern River, Calif., by F. H. Olmsted, and Reconnaissance of Yuba River, Calif., by Marsden Manson. 1901. 57 pp., 8 pls. 10c.

Describes topography of Kern River basin, gives estimates of daily and monthly discharge and discusses possible utilization of storage sites and development of power. The second paper in the report gives similar data for Yuba River.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

Contains information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc.

*58. Storage of water on Kings River, Calif., by J. B. Lippincott. 1902. 101 pp., 32 pls. 15c.

Discusses physical features, rainfall, stream flow, evaporation and seepage, and power development; includes chapter (by Lewis A. Hicks) on the generation and transmission of electric power and installation of pumping plants.

*59. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part I, by J. B. Lippincott. 1902. 95 pp., 11 pls.

*60. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part II, by J. B. Lippincott. 1902. 45 pp. (97–141), 15c.

Nos. 59 and 60 describe topography, soil, climate, crops, canals, wells, and pumping plants; discuss briefly the manufacture of Portland cement in southern California.

*81. California hydrography, by J. B. Lippincott. 1903. 488 pp., 1 pl. 25c.

A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference for engineers and irrigators.

86. Storage reservoirs on Stony Creek, Calif., by Burt Cole. 1903. 62 pp., 16 pls. 15c.

Discusses briefly water supply of Glenn County as related to population and industry, irrigation districts, the proposed Stony Creek forest reserve, and storage sites on Grindstone, Salt, Briscoe, and Stony creeks.

89. Water resources of the Salinas Valley, Calif., by Homer Hamlin. 1904. 91 pp., 12 pls. 15c.

Describes briefly the geography, topography, general and economic geology, climate, water supply, and irrigation of the Salinas Valley.

*103. A review of the laws forbidding pollution of inland waters in the United States by E. B. Goodell. 1904. 120 pp. Superseded by 152.

Cites statutory restriction of water pollution in California.

*112. Underflow tests in the drainage basin of Los Angeles River, by Homer Hamlin. 1905. 55 pp., 7 pls. 5c.

Discusses conditions under which ground water occurs in arid regions, and fluctuations in water level; describes machinery and methods used in sinking test wells and the results obtained at each station.

116. Water problems of Santa Barbara, Calif., by J. B. Lippincott. 1905. 99 pp., 8 pls. 10c.

Reviews earlier work in Santa Barbara region and describes near-by and distant water supplies, including Ventura and Santa Ynez rivers; discusses the quality of the water of the Santa Ynez (giving analyses) and the available reservoir sites.

*122. Relation of the law to underground waters, by D. W. Johnson. 105. 55 pp. 5c.

Cites legislative acts relating to ground waters in California.

*137. Development of underground waters in the eastern coastal-plain region of southern California, by W. C. Mendenhall. 1905. 140 pp., 7 pls. 35c.

*138. Development of underground waters in the central coastal-plain region of southern California, by W. C. Mendenhall. 1905. 162 pp., 5 pls. 25c.

*139. Development of underground waters in the western coastal-plain region of southern California, by W. C. Mendenhall. 1905. 105 pp., 8 pls. 25c.

Three reports discussing the topography, crops, irrigation systems, and wells, and the effects of development and drought on changes in ground-water level. The area covered by these reports includes the Anaheim, Santa Ana, Downey, Las Bolsas, Santa Monica, and Redondo quadrangles in Orange and Los Angeles counties.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Contains chapters on measurements of underflow of Rio Hondo, San Gabriel, and Mohave rivers.

*142. The hydrology of San Bernardino Valley, Calif., by W. C. Mendenhall. 1905. 124 pp., 12 pls. 25c.

Discusses rainfall, soils, artesian areas, temperature, and chemical character of the ground waters, gives tables of flow of Santa Ana River, Mill Creek, and other streams, and lists of wells in Redlands and San Bernardino quadrangles.

146. Proceedings of second conference of engineers of the Reclamation Service; with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

A report on "Underground waters of southern California," by W. C. Mendenhall. Gives an account of early irrigation by use of surface waters, the development of artesian wells for irrigation, and discusses the origin, distribution, and character of the artesian waters, the causes of fluctuations in the supply, and the need of moderation in use.

A report on the Klamath project, by J. B. Lippincott. Describes Klamath River and its principal tributaries and Lost River and Tule Lake. Describes also the irrigable lands in Butte Valley and around Tule and Lower Klamath lakes and in the Klamath Indian Reservation.

A brief report on "Pumping underground water in southern California," by F. C. Finkle. Discusses underground reservoirs, the source, extent, and methods of replenishment of the water supply, and describes the efficiency of pumps and the development of electric power for pumping.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c. Contains:

Sacramento River flood, California, from report of S. G. Bennett. Gives accounts of flood on Sacramento River; describes briefly the streams of the basin, precipitation, discharge, damages, and prevention of future losses.

*149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in California.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates of flood flow and frequency (p. 85) for Tuolumne River at La Grange, Kern River at Rio Bravo ranch, and Kings River at Sanger.

*213. The surface water supply of California, 1906, by W. B. Clapp, with a section on ground-water levels in southern California, by W. C. Mendenhall. 1907. 219 pp., 4 pls. 25c.

Contains the results of a series of measurement of the fluctuation of ground-water levels made during 1904, 1905, and 1906. The wells were "so selected that they would be evenly distributed over the various basins which together make up the lowland areas of southern California, and would thus give an adequate basis for conclusions as to conditions in each of these basins."

*219. Ground waters and irrigation enterprises in the foothill belt, southern California, by W. C. Mendenhall. 1908. 180 pp., 9 pls. 50c.

Describes the general geologic conditions, physical features, rainfall, storage facilities, character and condition of subterranean reservoirs, measures for conservation of waters, and the ground waters by districts; discusses fluctuation in ground-water levels and gives results of measurements; describes irrigation enterprises and systems and gives statistics of wells.

*220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring. 1908. 86 pp., 10 pls. 20c.

Describes the rocks, streams, lakes, and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters. The greater part of the area described is considered part of the Great Basin, but the streams of a small area in the southern part are tributary to Goose Lake, which within historic times has overflowed southward to Pit River, a tributary of the Sacramento.

*222. Preliminary report on the ground waters of San Joaquin Valley, Calif., by W. C. Mendenhall. 1908. 52 pp., 1 pl. 10c.

Describes the geography of the valley, the rocks, soils, surface waters, and the origin, circulation, quantity, accessibility, and development of the ground waters; gives notes on water supply by counties.

237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.

Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.

251. Surface-water supply of the United States, 1907–8, Part XI. California, by W. B. Clapp and W. F. Martin. 1910. 363 pp., 7 pls. 35c.

Contains a section (pp. 338–348) on "fluctuations in ground-water levels in the valley of southern California." The measurements here published form a continuation of those published in Water-Supply Paper 213. They were made at irregular intervals during 1907–8 on the same wells that were measured during the earlier period, except for a few wells that had become inaccessible.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describe collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Sacramento, Pit, Feather, Yuba, and American rivers, Stony and Putah creeks, and Tuolumne River; also of Link River, Oreg., in Klamath River basin.

295. Gazetteer of surface waters of California, Part I, Sacramento River basin, by B. D. Wood. 1912. 99 pp. 10c.

296. Gazetteer of surface waters of California, Part II, San Joaquin River basin, by B. D. Wood. 1912. 102 pp. 10c.

297. Gazetteer of surface waters of California, Part III, Pacific Coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.

Nos. 295–297 embrace descriptions of streams and lakes named on best available maps of California.

*298. Water resources of California, Part I, Stream measurements in Sacramento River basin, by H. D. McGlashan and F. F. Henshaw. 1912. 411 pp., 8 pls. 30c.

*299. Water resources of California, Part II, Stream measurements in San Joaquin River basin, by H. D. McGlashan and H. J. Dean. 1912. 439 pp., 7 pls. 35c.

300. Water resources of California, Part III, Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.

Nos. 298–300 comprise all data concerning stream flow in California available up to September 30, 1912. The reports describe the drainage basins, precipitation, temperature, and forests, and give the results of work at gaging stations. See also Nos 295–297.

338. Springs of California, by Gerald A. Waring. 1915. 410 pp., 13 pls. 60c.

Describes briefly the physical features of California, including the coast ranges, Great Central Valley, the lava-covered region, the Sierra Nevada, the southeastern desert, and faults; defines "mineral water" and "pure water"; discusses source and amount of substances in waters; degree of concentration of natural waters and their properties, and the therapeutic value, temperature, and classification of mineral waters. The springs are described under the headings "hot," "carbonated," "sulphur," "saline," "magnesic," "iron," "artesian," "large cold," and "minor perennial" springs.

345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(A) Ground-water resources of the Niles cone and adjacent areas, California, by W. O. Clark. Describes an area just east of the south end of San Francisco Bay. The investigation on which the report is based was made "to determine the source of the ground water, the quantity now being withdrawn, the amount available, and the area dependent on Alameda Creek." Describes the physiography and drainage of mountain and valley areas; gives records of precipitations in Alameda and Santa Clara counties and of the monthly discharge of Alameda Creek; discusses the source of the ground waters, the effect of the Niles-Irvington fault, contributions to the ground-water supply, relation of withdrawals to contributions, and gives a summary of conclusions.

363. Quality of the surface waters of Oregon, by Walton Van Winkle. 1914. 137 pp., 2 pls. 20c.

Among the drainage basins described is Goose Lake, which has within historic times discharged southward to Pit River, a tributary of the Sacramento, and Klamath River, which enters the Pacific in northern California.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of water from Matilija Hot Springs, Calif., and of mine waters from Nevada City and Sulphur Bank [near Clear Lake], Calif.

375. Contributions to the hydrology of the United States, 1915; Nathan C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(a) Ground water for irrigation in the Sacramento Valley, Calif., by Kirk Bryan. Describes the geography and the geology of the valley and the origin and the movements of the ground water, and discusses problems relating to wells and to pumping; gives a brief account of the progress of irrigation with well water.

398. Ground water in San Joaquin Valley, Calif., by W. C. Mendenhall, R. B. Dole, and Herman Stabler. 1916. 310 pp., 5 pls. 25c.

Describes the geography of the valley and gives the geologic outline of the rocks of the border and the origin of the present surface; describes the occurrence and utilization of ground water, the chemical composition of surface and ground waters, and gives notes by counties. Contains 62 tables, most of which relate to the qualities of the waters.

*400. Contributions to the hydrology of the United States, 1916; Nathan C. Grover, chief hydraulic engineer. 108 pp., 7 pls. Contains:

(e) Ground water for irrigation in the Morgan Hill area, Calif., by W. O. Clark.

426. Southern California floods of January, 1916, by H. D. McGlashan and F. C. Ebert. 1918. 81 pp., 17 pls. 15c.

Compares the flood of January, 1916, with previous floods, summarizes the damages, and gives flood-flow records.

429. Ground water in the San Jacinto and Temecula basins, Calif., by G. A. Waring. 1919. 113 pp., 14 pls.

*446. Geology and ground waters of the western part of San Diego County, Calif., by A. J. Ellis and C. H. Lee. 1919. 321 pp., 47 pls.

450. Contributions to the hydrology of the United States, 1919; N. C. Grover, chief hydraulic engineer.

(b) Ground water in Lanfair Valley, Calif., by D. G. Thompson. pp. 29–50, pls. v–vi.

(c) Ground water in Pahrump, Mesquite, and Ivanpah valleys, Nev. and Calif., by G. A. Waring. pp. 51–86, pls. vii–xi.

490. Routes to desert watering places in California and Arizona.

*(a) Routes to desert watering places in the Salton Sea region, Calif., by J. S. Brown. pp. 1–86, pls. i–vii.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II, Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xiv, 395 pp., 30 pls. (67–96) and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall, and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201–289. Includes statement of the Director to the House Committee on Irrigation and extracts from the constitutions of States relating to irrigation.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. *Pt. II, Irrigation, xviii, 576 pp., 93 pls. (54–146.) $2. Contains:

*Report upon the location and survey of reservoir sites during the fiscal year ended June 30, 1891, by A. H. Thompson, pp. 1–212, pls. 54–57. Describes reservoir sites in California; for each reservoir site gives the location, height of dam, area inclosed by top contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River drainage.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. (108–184.) $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, pls. 147–182. Describes results of surveys of High Sierra reservoirs—Bear Valley, Kennedys Meadow, Kennedys Lake, Lake Eleanor, Tuolumne Meadows, Lake Tenaya, and Little Yosemite—and of Clear Lake, Calif.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 42 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant and swamp lands, and private and miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report, United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. 5 parts in 6 volumes. *Pt. IV, Hydrography, x, 756 pp., 102 pls. $1.75. Contains:

*Reservoirs for irrigation, by J. D. Schuyler, pp. 617–740, pls. 48–102. Describes rock-fill, masonry, and earthen dams, and hydraulic dam construction in California, and projected reservoirs; gives tables of reservoir capacities and areas.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest Reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The San Gabriel Forest Reserve, by J. B. Leiberg, pp. 411–428, pls. 143–146. The San Bernardino Forest Reserve, by J. B. Leiberg, pp. 429–454, pls. 147–153. The San Jacinto Forest Reserve, by J. B. Leiberg, pp. 455–478, pls. 154–159. Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific and part by streams that are lost in the sands of the Mohave and other deserts.

PROFESSIONAL PAPER.

Professional papers are distributed free by the Geological Survey as long as the stock lasts. An asterisk (*)indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp.; 34 pls. 1917. 50 c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subjects, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests [illegible] of the streams now carrying heavy loads of débris.

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BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in California, and detailed records of wells in Monterey and San Diego counties, California. These wells were selected because they give definite stratigraphic information.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California; and detailed records of wells in Alameda, Fresno, Kern, Orange, San Luis Obispo, Santa Clara, Tulare, and Ventura counties. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[5] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States. A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surfaces. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to ground-water horizons. Economic-geology and artesian-water maps are included in folios, if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization on mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock geologic folios was more or less damaged by fire and water, but many are usable, and will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive; also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sell for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

[5] Index maps showing areas in California covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*17. Marysville folio.
*39. Truckee folio.
*66. Colfax folio.
*101. San Luis folio.
*138. Redding folio.
*163. Santa Cruz folio.
193. San Francisco folio. 75c. in either edition.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the Pacific slope of California are the reports of the Chief of Engineers, U. S. Army, the State engineer and surveyor, the State conservation commission and the State water commission.

The following reports deserve special mention:

Hall, W. H., Physical data and statistics of California, 1886.

Report of the Commissioner of Public Works to the Governor of California, 1895.

Report of the State Water Commission of California, 1912.

Subterranean storage of flood waters by artificial methods in San Bernardino Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 335–400, 3 pls.

Gives history and methods of water spreading and amount of water spread along Santa Ana River and other streams. Gives data in regard to precipitaion, run-off, and stream percolation in the San Bernardino Basin. Describes the ground-water reservoir in this basin, giving data on fluctuations of the water table and the artesian head. Discusses ground-water fluctuations in other basins in southern California and draws conclusions as to the effect of water spreading. Includes a map showing the original area of artesian flow in the San Bernardino Basin and the areas in 1904 and 1912; also locations of wells and of lands used for spreading water.

Ground-water resources of Indian Wells Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 1–40, 429, 5 pls.

A brief report covering the arid valley (also known as Salt Wells Valley) that lies mostly in northeastern Kern County but extends into Inyo and San Bernardino counties and comprises a part of the area included in Tps. 25–27, Rs. 38–30. Gives information in regard to precipitation, stream flow, evaporation of ground water, and water supply available by pumping from wells.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations.

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.
Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.
Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.
Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.
Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.
Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.
Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls. (15–16). 10c.
Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.
Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.
Describes methods of measuring velocity of water and of measuring and computing stream flow, and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second enlarged edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.
Discusses origin, depth, and amount of ground waters, permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow; and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.
Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.
Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.
First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]
Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by George Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.
Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.
Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)
Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classified according to scope the statutes enacted in the different States.

*110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10 cts.
Contains the following reports of general interest. The scope of each paper is indicated by its title.
Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.
The California or "stovepipe" method of well construction, by Charles S. Slichter.
Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.
Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.
Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.
The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., and the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.
Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cities State legislative acts affecting them.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of Eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers (scope indicated by title) of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged by R. E. Horton.

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thomas H. Means.

Cost of stream-gaging work, by E. C. Murphy.

Equipment of a cable gaging station, by E. C. Murphy.

Silting of reservoirs, by W. M. Reed.

Farm-unit classification, by D. W. Ross.

Cost of power for pumping irrigating water, by H. A. Storrs.

Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

*155. Fluctuation of the water levels in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuations due to rainfall and evaporation, barometric change,, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, ground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to underground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, and sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes; recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers, by Chicago sewage (a digest of the testimony taken in the case of The State of Missouri *v.* The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of water east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament, reviews work of bureau of hydraulics and agricultural improvements of the French department of agricultures and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well water, and methods of prevention, tests of capacity and measurement of depth, and cost of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

334 The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the cause of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

*(e) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

*(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

*425. Contributions to the hydrology of the United States, 1917. N. C. Grover, chief hydraulic engineer. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94.

427. Bibliography and index of the publications of the United States Geological Survey relating to ground water, by O. E. Meinzer. 1918. 169 pp., 1 pl.

Includes publications prepared, in whole or part, by the Geological Survey that treat any phase of the subject of ground water or any subject directly applicable to ground water. Illustrated by map showing reports that cover specific areas more or less thoroughly.

ANNUAL REPORTS.

Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlain, pp. 125–173, pl. 21. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. *Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107–146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111–146. Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W. J. McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analyses of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v. 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6–16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous, medium, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

*86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Calif., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy load of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of available analyses.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 44 pp. 1908. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formation, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

*616. The data of geochemistry (third edition), by F. W. Clarke. 1916. 821 pp. 45c.

Earlier editions were published as Bulletins 330 and 491. Contains a discussion of the statement and interpretation of water analyses, and a chapter on "Mineral wells and springs" (pp. 179–216). Discusses the definition and classification of mineral waters, changes in the composition of water, deposits of calcareous, ocherous, and siliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to volcanism. Describes the different kinds of ground water and gives typical analyses. Includes a brief bibliography of papers containing water analyses.

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[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications as noted in abstracts.

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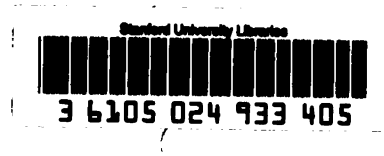

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